PHYSICS RESEARCH IN INDIA

As Reflected by *INSPEC-Physics*, 1990 & 1994

S.M. Dhawan
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And

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Submitted to the
National Information System in Science & Technology
Department of Scientific and Industrial Research
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FOREWORD

Science indicators and evaluation of science are rather recent developments. Scientists, in general, do not pay much attention to these aspects and often it is the social scientists and the information professionals who work in these areas. It is not to say scientists have totally abdicated their responsibility to develop self-governing systems to run the scientific enterprise at optimal costs and efficiency. After all, it was Alvin Weinberg, a Presidential Adviser, who laid the foundations for the science indicators movement in the USA, and even Eugene Garfield who provided the key tools for the field started out as a chemist.

Today the indicators movement and performance evaluation in science and technology are well entrenched in the Western World, on both sides of the Atlantic. The USA, as always or almost always, took the lead when in 1972 the National Science Foundation brought out the first ever national Science Indicators. The Europeans had to wait till they formed and stabilised their Union before they could bring out their first such report in 1994.

Prof. Abdus Salam pointed out time and again, throughout the later part of his prodigiously productive life, that we in the developing countries were pretty slow in this kind of activity.

Fortunately, thanks to the Department of Science and Technology and the DSIR, we in India now have an ongoing programme of developing science indicators. Although not

as extensive as the exercises being carried out in the USA, European Union, OECD, etc., the Indian experience is rather important for us, especially in these times of globalization, liberalization of the economy and increased awareness of cost-effectiveness.

In the entire gamut of indicators, scientists will be especially interested in indicators relating to their own publications. That is precisely what DSIR is now attempting to provide through a series of reports commissioned by them. I have great pleasure in introducing the report on physics research in India, based on a meticulous analysis of two years of the CD-ROM version of Physics Abstracts, called INSPEC-Physics, written by two information professionals whom I know very well.

Surinder Dhawan and Subbiah Arunachalam have, to my mind, done a very fine and commendable job. They have analysed a collection of more than 8,000 records - all papers written by Indian scientists - and constructed a number of tables, each one serving the purpose of a ready reckoner. Now we know what we always knew (!) but with the backing of authentic numbers. They have answered questions such as: Which are the prolific publishing institutions in physics? Which journals do we publish in often? Are we publishing in high impact journals? In what subfields of physics we have a substantial presence? And the list is endless.

Honestly, these are questions for which we always wanted to know the right answers, but found it difficult to find the answers. To that extent, we are indebted to the authors of this report. But as they point out in

their report, through a quote from a foreign Fellow of INSA, often developing countries tend to choose problems in a random fashion without much thought to their implications for their short/medium term needs. The use of *INSPEC-Physics* as the primary source gives its own flavour to the results of the analysis. There is, however, no doubt, that the efforts of Dhawan and Arunachalam will have been rewarded if science managers and policymakers use their data and inferences judiciously to give a proper orientation to our research programmes.

Let me close by wishing them both more sleepless nights and many more such useful reports. Well done my colleagues.

E S Raja Gopal
Former Director
National Physical Laboratory

March 6, 1998

PROLOGUE

An interesting analysis of our scientific publications has been carried out. This is a serious analysis based on numbers. The impact of scientific works can be judged by a number of different criteria. The publication impact analysis is one of the indexes and it has its limitations. The report should thus be seen with these limitations in mind, and spirit of the report conveys this.

Two questions arise from the report. Indian contribution (measured by its publication impact) is around 2.5%. Is it good or bad? It is definitely not very good. A country of a size of India should do better. However, one has also to look at the input. In India we often believe in a magic that good output can come out from no input! Advanced countries produce a significantly higher publications. Their input to the science is also significantly higher. I have a suspicion that if we normalize the publication numbers by the total financial input to science the Indian figure will be definitely comparable to the advanced countries. One can only reach one conclusion from that. Our scientific potential cannot be utilized with subcritical input.

The second issue is a negative growth in publication. It may be a passing phase. But it may also reflect the overall negative approach to science.

In the present economics and economy driven value system scientific activity does not find overall support. Besides, the input of young minds to science has gone down. I will be very sad if the negative growth in publication is a reflection of this trend.

Finally, my deep appreciation of the efforts put forward by the authors.

Prof. A. K. Raychaudhuri
Director
National Physical Laboratory
New Delhi

March 6, 1998

PREFACE

National Information System in Science and Technology (NISSAT), Department of Scientific and Industrial Research, Government of India, New Delhi commissioned in 1996 a series of studies on mapping of science in India using bibliographic databases. The present study is a part of this larger programme and looks at the physics research enterprise in country using *INSPEC-Physics*.

By using *INSPEC-Physics* for 1990 and 1994 we have examined India's contributions to the world's research output in physics. We have provided quantitative information on papers contributed by classes under physics, type of treatment applied to the physics research studies--whether experimental or theoretical, journals used for reporting papers for publication, presence of Indian contributions in high impact journals, and on research institutions in India contributing to physics research and their geographic distribution. The purpose of this study is not to capture major developments in physics research in India or to provide some insight into the quality of work done in India. Rather, the focus of the study has been to provide some insight into its strengths and weaknesses in the physics research enterprise. Accordingly, this study has examined the Indian scenario in the context of scenario prevailing in the developed as well as developing countries.

We thank the NISSAT, Department of Science and Technology, Government of India, New Delhi for their financial support. I thank Prof. E.S.R. Gopal, former Director, National Physical Laboratory, New Delhi, and

Prof. A.K. Raychaudhuri, Director, National Physical Laboratory, for their encouragement to pursue such scientometric studies. I also owe a special word of thanks to Prof. Gopal for his valuable comments and suggestions on the outcome of this project.

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March 6, 1998

CONTENTS

EXECUTIVE SUMMARY

This study maps physics research enterprise in India using bibliographic data indexed in *INSPEC-Physics* for 1990 and 1994. The database had 4552 records on the Indian contributions in 1990, and 4211 records in 1994. The data were collected and examined in the context of contributions from the developed and developing countries during the same period.

India ranks tenth in the world for its contribution to the world' publication output in physics. Its contribution to the world output has declined from 2.91% publications in 1990 to 2.66% in 1994. Besides India, Russia also suffered decline in its contributions to the world output.

India's share in the world output by subject ranges between 2% and 3% in all the 10 main fields of physics. On the other hand USA's share ranges between 21.41% and 36.06%. In comparison to the output from other selected countries USA's share is maximum. Clearly, it is the world leader in physics research.

The countries posting higher levels of productivity have been found to belong to the developed world bloc. And those posting lower levels, to the developing world bloc. The greater the economic development of a country the higher its research productivity likely to be.

The leading areas of research in physics in India are: (1) 'condensed matter physics: structure ....'; (2) 'condensed matter physics: electronic structure .... ';

(3) 'cross-disciplinary physics'. Since a large proportion of these areas also contribute to materials science, one can state that there is a considerable activity in 'materials science'. Analysis of publication data at the second level of classification also confirms that materials science is a leading area of research in India. It has emerged as the top ranking subfield, accounting for 9.76% of the total Indian output, the highest contribution under any subfield.

Research priorities of the countries selected for the study were determined on the basis of their activity index. The priorities differ from country to country, even among the countries belonging to the same economic bloc. India's priority areas are: 'condensed matter physics: electronic structure .... '; 'condensed matter physics: structure .... '; 'atomic and molecular physics'; and 'geophysics, astronomy, astrophysics'.

Significant shift in the emphasis on research has been noted in most countries under study from 1990 to 1994. India has shown some rise in its activity index in 'physics of elementary particles' and 'cross-disciplinary physics'. On the other hand, its activity index in 'fluids, plasmas, electric discharges' has declined sharply. Interestingly, it is emerging as an important field of research. Countries such as the USA, Japan, Germany, Russia, France have increased their activity in this field.

The bulk of research studies conducted in India is either experimental or theoretical. In fact the trend world over is the same.

95.57% of Indian output is being reported for publication in journals. Journals published from UK, USA, Netherlands, Germany, and Switzerland account for 70% of Indian output and the rest of the output by the journals from India and other countries. A total of 678 journal titles from over 30 countries have been used for reporting Indian contributions. It includes 51 Indian journals.

The number of journals carrying Indian contributions in larger number is very small. Presence of contributions in sufficiently large number in any important journal is indeed essential to making perceptible impact on the research community. There were only 66 journals which reported more than 30 papers each from India during these two years.

Presence of publications in high impact journals is considered as an index of their importance. It is noted that the number of journals indexed in SCI and used for publishing Indian contributions has increased marginally from 359 journals in 1990 to 375 in 1994, despite the fact that there was 0.24% fall in the Indian output in 1994. However, such a presence of Indian output is largely limited to journals (86%) with impact factor of 2.000 or less.

The cumulative impact of Indian contributions has increased from 3597.782 in 1990, and 4037.217 in 1994. Clearly, the volume of Indian contributions going into *SCI* indexed journals has indeed increased.

Academic institutions account for the bulk to the Indian output in physics research. Research agencies as a group rank second. The organisations in the public and private sector as a group rank third. The leading institutions in India are Bhabha Atomic Research Centre, Bombay; Indian Institute of Sciences, Bangalore; Tata Institute of Fundamental Research, Bombay ; Indian Institute of Technology, New Delhi; Indian Institute of Technology, Madras ; Banaras Hindu University, Varanasi; National Physical Laboratory, New Delhi; Jadavpur University, Calcutta; Indian Institute of Technology, Kharagpur; Indian Association for the Cultivation of Science, Calcutta; Indian Institute of Technology, Kanpur; Indian Institute of Technology, Bombay; University of Delhi, Delhi; Saha Institute of Nuclear Physics, Calcutta; Indira Gandhi Centre for Atomic Research, Kalpakkam.

Maharashtra, West Bengal, Delhi, Uttar Pradesh, Karnataka, Tamilnadu, Andhra Pradesh are the top seven states in the country in terms of their contributions to physics research. Put together they contribute as much as 80% of the total output from India. In particular, Maharashtra contributed 16.85%, West Bengal, 14.22%, Delhi 9.99%, and Uttar Pradesh , 9.49%.

Physics research enterprise in India is localised to a small number of institutions situated in few states. For example, just 51 institutions account for 70% of Indian output, and just seven states of India account for 80% output.

PHYSICS RESEARCH IN INDIA
As Reflected by *INSPEC-Physics*, 1990 & 1994

1. INTRODUCTION

This study is based on the premise that the literature of science can be seen as a mirror that reflects research efforts of a country or the world as a whole. Since bibliographical databases are intended to be faithful records of the literature, one can use them to quantify and characterise or map the research enterprise. What is more, analysis of the published literature, together with citation analysis data, can form the basis of evaluation of that part of scientific research in a country which gets published in open literature.

Glanzel and others have mapped physics in the European Union.[1] Arunachalam and coworkers, working on a project funded by Department of Science and Technology, have quantified and characterised Indian contributions to science using major international databases such as *Mathsci* (mathematics, statistics, etc.), *Medline* (medicine), and *Materials Science Citation Index*.[2-3] One of the studies in that series was on physics research in India based on *INSPEC-Physics* database 1992 by Arunachalam and Dhawan.[4] This report extends the earlier study and uses the same database for two more years, 1990 and 1994. Since *INSPEC-Physics* does not cover patent literature, unlike for example *Chemical Abstracts*

service which includes patent literature, the study is restricted to the publications in open scientific journals.

2. METHODOLOGY

2.1 Data Sources

INSPEC database on CD-ROM is available either as a whole (INSPEC-On Disc) or in two parts *(INSPEC-Physics, INSPEC-Electrical, Electronics and Control Engineering)*. *INSPEC-Physics* was used as the source database for building up data on Indian contributions to physics. Institutional address of the first author, which is invariably a part of the author affiliation field in the INSPEC database, was exploited for identifying Indian contributions indexed in the database. All records incorporating 'India' as a term in the author affiliation field were retrieved and downloaded from *INSPEC-Physics* databases published for 1990 and 1994. A typical INSPEC record comprises as many as 14 fields. Not all fields were downloaded. The fields downloaded were as follows:

INSPEC record number
Type of document
Institutional affiliation of the author
Journal title
Year of publication
Country of publication
Treatment of the work
Classification number
ISSN, CODEN

Besides the bibliographic data on Indian publications in physics, quantitative data on publication output by country and by subfield were also retrieved and downloaded.

Directory of R & D Institutions, 1994 published by the Department of Science & Technology, Government of India, was used as the source for classifying research institutions of author affiliations, into various categories such as universities, scientific departments, central ministries, and public and private sector companies.

Journal Citation Reports, 1994, published by the Institute for Scientific Information, Philadelphia, USA, was used as the source for data on journal impact factors.

2.2 Data Processing

The bibliographic data on Indian publications in physics, downloaded from *INSPEC-Physics* database were converted from text format into database format. The data so converted were processed using FoxPro.

Before processing for tabulation, the bibliographic data on Indian contributions in physics were first cleaned up of inconsistencies in the description of institution names, city and state. Inconsistencies in the description of journal titles and their places of publication were also rectified using *Ulrich's Plus 1996*. *Impact factors of journals were incorporated in* the database.

INSPEC-Physics classification was used for data analysis by subject. *INSPEC-Physics* classifies physics literature into 10 broad subject groups, A0 to A9. It

further subdivides these 10 groups into 61 subfields. The letter 'A' prefixing a class number indicates that the classified record is a part of the *INSPEC-Physics* database. [The prefix B is used in records belonging to *INSPEC-Electrical, Electronics and Control Engineering*]

After data cleaning, tables were created for data description and analysis using FoxPro.

2.3 The Indicators

2.3.1 Publication Indicators

A. Publication Count:

Publication count is a measure of a country's research efforts. For mapping these efforts, publications were classified and counted by subfields, by type of publication, by journal title, by country of publication and impact factor of the journal, by type of research institution, by institution name, and by institution place.

To see India's contribution in perspective we have provided the number of papers, classified by major fields and subfields, published from the USA, the UK, France, Germany, Russia, Japan, Australia, Canada, Italy, China, Israel, and Korea. Since INSPEC classifies a publication under more than one field, the total count of papers under different subfields does exceed the total under all fields of physics.

B. Activity Index

Activity index (AI) is the ratio of

$$AI = \frac{\textit{the country's share in world's publication output in the given field}}{\textit{the country's share in world's publication in all physics fields}}$$

AI characterises the research efforts of a country in a given field of physics relative to other fields of physics. AI equal to 100 indicates that the relative efforts of the country in that field correspond to the world average. AI greater than 100 indicates that relative research efforts in that field are above the world average. AI is computed by the formula:

$$\frac{(f_i / \Sigma f_i)}{(F_i / \Sigma F_i)} * 100$$

where

f_i = publication count in the given field of a country
Σf_i = world's publication output in the given field
F_i = publication count of a country in all physics fields
ΣF_i = world's publication output in all physics fields

2.3.2 Citation Indicators

Impact factor -- the ratio of the frequency of citations to papers published in a journal in a given year to the total of citable items which it published in the two preceding years -- is an index of the relative importance of a journal. Often scientists prefer to place their research papers in journals of high impact factor for such journals provide greater probability to make their contributions visible.

3. DATA ANALYSIS

There were 4552 records from India in INSPEC-Physics in 1990, and 4211 records in 1994. Data on publication output in respect of other countries selected for the study is given in Appendix-1.

PART A: DIRECTIONS OF RESEARCH EFFORTS IN INDIA

3.1 India's Share in the World's Publication Output

India ranks tenth in the world for its contribution to the world literature on physics.

Based on 1994 publication data, it is observed that India ranks tenth in the world for its contribution to the world literature on physics (Table 1, Fig. 1).

Table 1: CONTRIBUTION OF SELECTED COUNTRIES TO WORLD LITERATURE ON PHYSICS IN 1990 & 1994

COUNTRY	PUBLI-CATION COUNT 1990	PUBLI-CATION COUNT 1994	% OF WORLD OUTPUT IN 1990	% OF WORLD OUTPUT IN 1994	SHIFT IN OUTPUT 1990 TO 1994	RANK BY COUNTRY OUTPUT IN 1994
USA	42801	43240	27.37	27.33	-0.04	1
JAPAN	14721	16177	9.41	10.22	0.81	2
GERMANY	10517	11615	6.73	7.34	0.61	3
RUSSIA	16506	10743	10.56	6.79	-3.77	4
UK	8319	9062	5.32	5.73	0.41	5
FRANCE	7686	8029	4.92	5.07	0.15	6
CHINA	5301	5960	3.39	3.77	0.38	7
ITALY	4230	4919	2.50	3.11	0.61	8
CANADA	4230	4642	2.71	2.93	0.22	9
INDIA	4552	4211	2.91	2.66	-0.25	10
AUSTRALIA	1716	2145	1.10	1.36	0.26	11
ISRAEL	1214	1476	0.78	0.93	0.15	12
KOREA	913	1417	0.58	0.90	0.32	13
WORLD	156367	158220	100.00	100.00	--	--

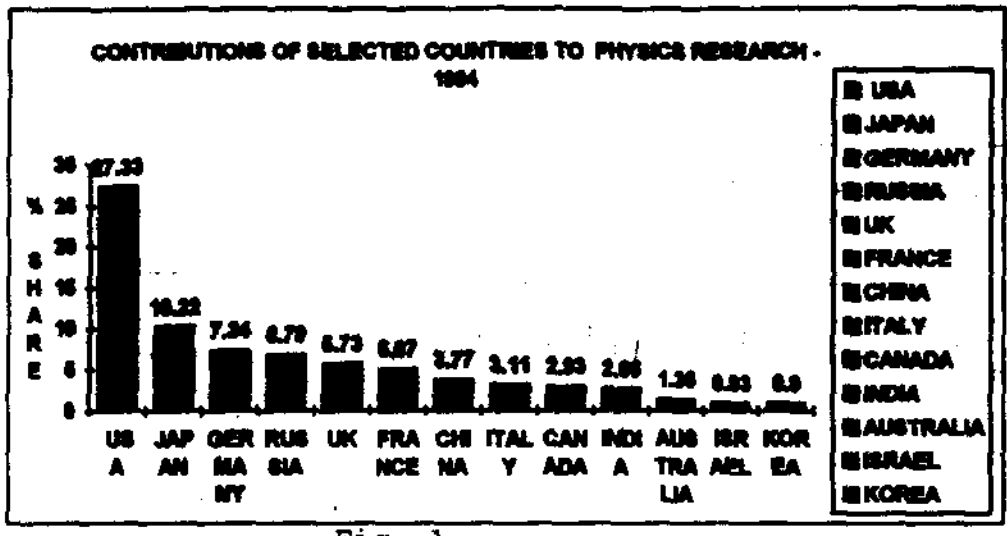

Fig. 1

USA tops the list, contributing as much as 27.33% to the world literature. The other countries that have published a larger number of papers than India, in 1994, are Japan (10.42%), Germany (7.34%), Russia (6.79%), UK (5.73%), France (5.07%), China (3.77%), Italy (3.11%), and Canada (2.93%) (Table 1, Fig. 1). India has contributed 2.66% publications in physics.

3.2 *Shift in the Publication Output of Selected Countries*

India and Russia have recorded a decline in their publication output by 0.25% or more, between 1990 and 1994.

India's share to the world literature was 2.91% in 1990 and it dropped to 2.66% in 1994. Russia's share also dropped by 3.77% from 10.56% in 1990 to 6.79% in 1994. USA, the world leader, also recorded a negligible decline from 27.37% in 1990 to 27.33% in 1994. Other leading performers of physics research recorded an

increase between 0.51% and 0.81% over the four years (Table 1, Fig. 2).

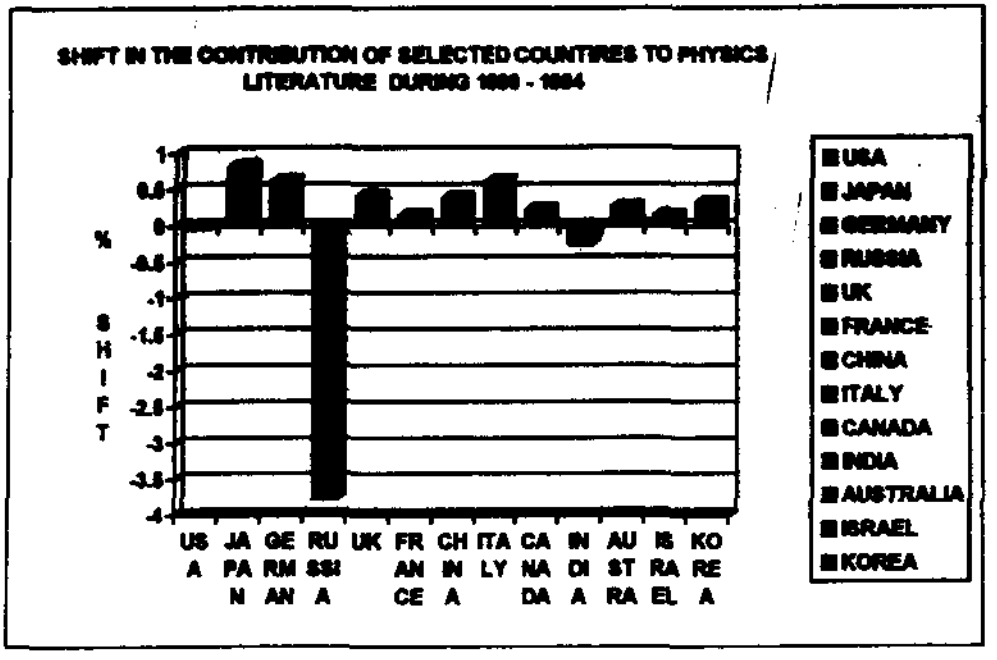

Fig. 2

3.3 *Country Share in the World Output by Subject*

India's share in the world literature by subject ranges between 2% and 3% in all the 10 fields in physics. USA is the world leader in all physics fields.

India's share in the world literature by subject ranges between 2% and 3% in all the 10 fields of physics (Appendix-2). USA has recorded the highest contribution ranging between 21.41% and 36.06% in the corresponding fields. Clearly USA is the world leader in all physics fields. Contributions from other countries from the developed world – Japan, Germany, Russia, the UK, France – range between 3.27% and 14.88%. Contributions from the developing world countries –

China, Israel, Korea -- range between 0.28% and 4.60% (Fig. 3).

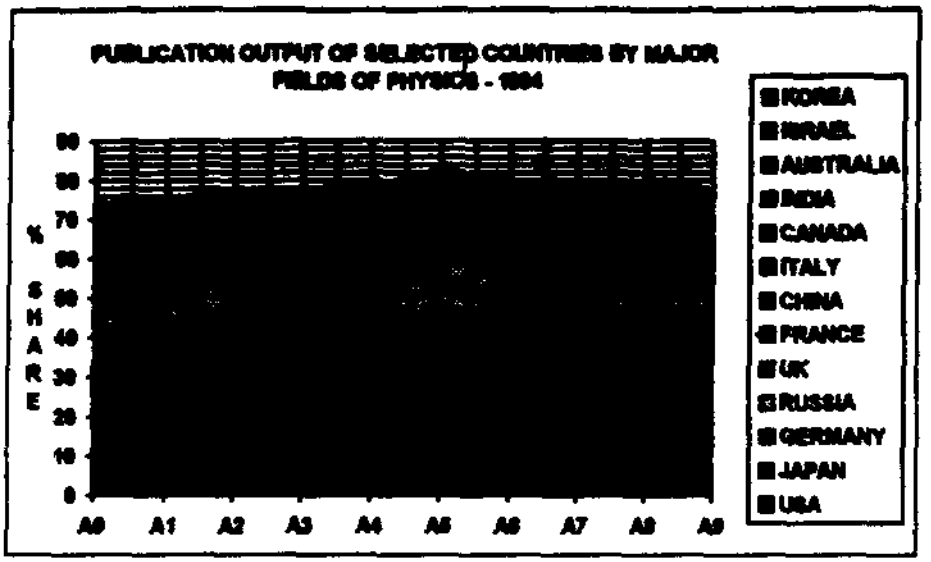

Fig. 3

A0 = General Physics
A1 = Physics of Elementary Particles
A2 = Nuclear Physics
A3 = Atomic and Molecular Physics
A4 = Classical Areas of Phenomenology
A5 = Fluids, Plasmas, Electric Discharges
A6 = Condensed Matter: Structure, thermal, mechanical properties
A7 = Condensed Matter: Electronic structure, electrical *magnetic and optical properties*
A8 = Cross-disciplinary physics
A9 = Geophysics, astronomy, astrophysics

Obviously, there are several factors that determine a country's level of economic development. One of these is the level of country's research efforts and productivity. The countries posting higher levels of productivity have been found to belong to the developed world bloc. And those posting lower levels, to the developing world bloc.

The greater the economic development of a country **the higher its research productivity likely to be.**

3.4 India's Output by Major Fields in Physics

Based on the 1994 data, the leading areas of research in physics in India are: (1) 'condensed matter physics: structure ...,' (A6, 29.1%); (2) 'condensed matter physics: electronic structure ....' (A7, 29.07%); (3) 'cross-disciplinary physics' (A8, 25.84%) (Fig 4). (Data taken from Appendix-3). Since a large proportion of 'condensed matter physics: structure ....', 'condensed matter physics: electronic structure ....', and 'cross-disciplinary physics' contribute to materials science, one can state that there is a considerable activity in 'materials science'.

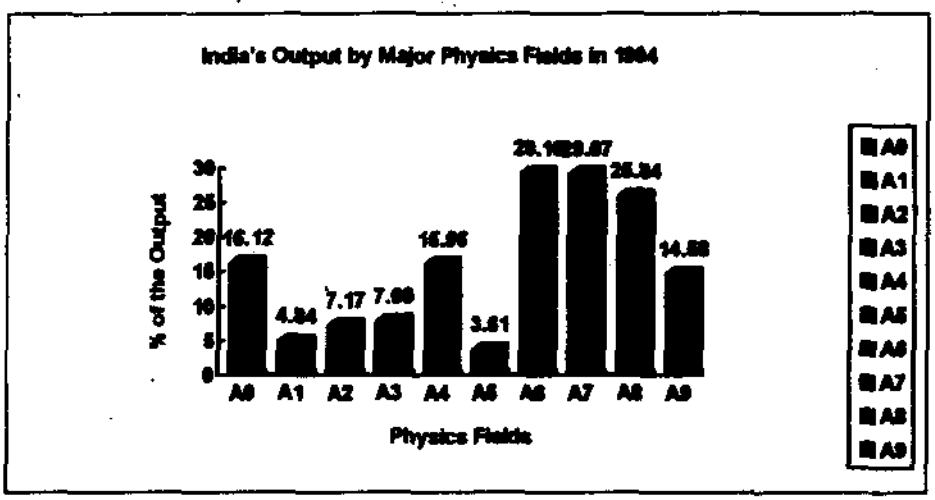

Fig. 4

India's contributions were ranked by subfields under physics (Appendix-4). Materials science has emerged as the top ranking subfield, accounting for 9.76% of the total Indian output, the highest contribution under any subfield. Second in rank is optics (4.09 %). The other subfields in the decreasing

order of contribution are crystallography--structure of liquids and solids (4.04 %), condensed matter studies--optical properties(4.03 %) , and fluid dynamics (3.89 %). There are 39 subfields which together share 90 % literature output from India. Appendix-5 lists the distribution by subfield class number.

India's strength in materials science is well known. More than a decade ago a conference convened by the US National Science Foundation determined that area as an area of strength in India and recommended that it is an area in which the USA could collaborate with India.[5] The Materials Research Society of India is among the well run scholarly societies of India.

In sum, materials science is the leading area of research in India

3.5 Research Priorities of Selected Countries

Research priorities differ from country to country, even among the countries belonging to the same economic bloc. The activity index gives an idea of the relative importance the selected countries has given to physics fields (Fig. 5, Appendix 6). USA performs far more research in 'geophysics, astronomy, astrophysics' (A9) than the world average. Its activity index in this field is 131.95. The other areas in which it has recorded activity index above the world average are: 'nuclear physics' (A2), 111.63; 'cross-disciplinary physics' (A8), 105.36; 'classical areas of phenomenology' (A4), 104.96. It performs relatively less research in 'condensed matter physics' than the world average (Appendix-6).

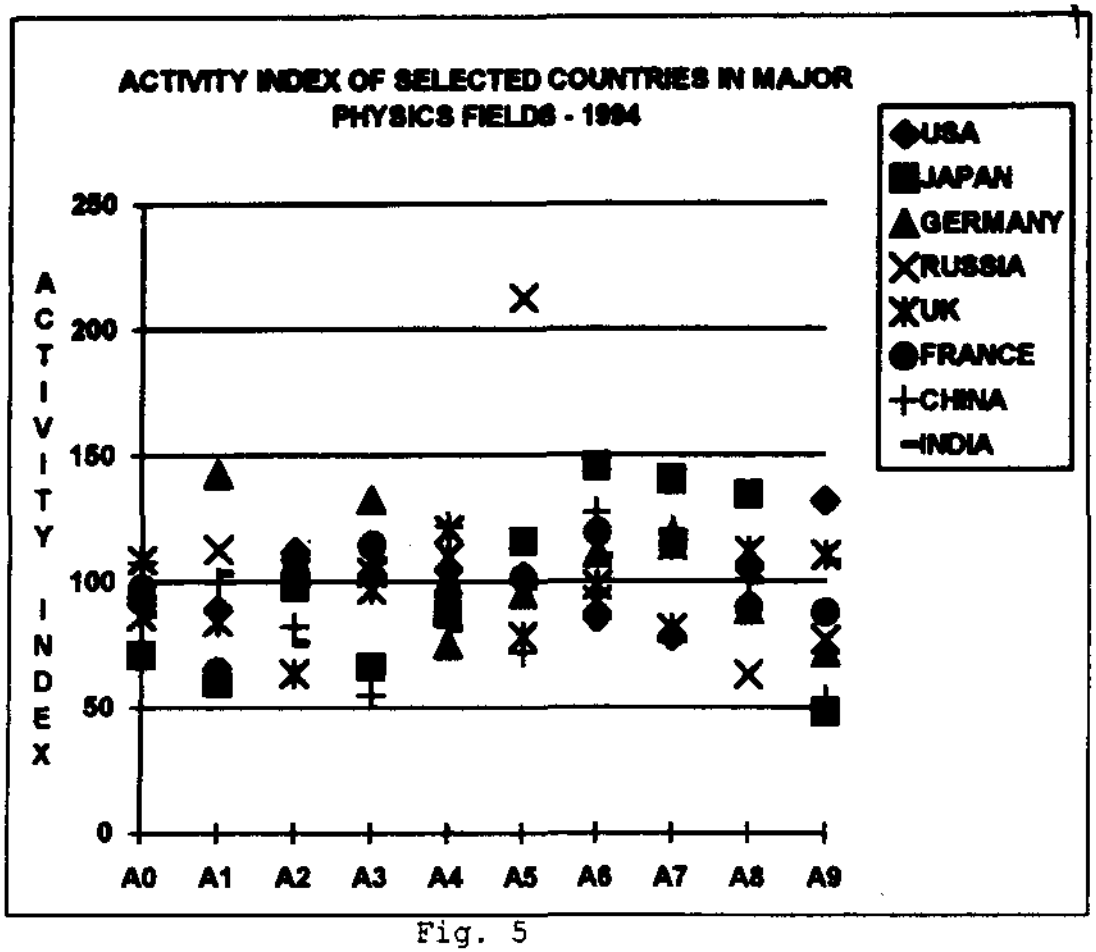

Fig. 5

In contrast, Japan, another country from the developed world bloc, accords high priority to materials science as revealed from a high activity index for 'condensed matter physics: structure ... '(A6), (activity index, 145.72); 'condensed matter physics: electronic structure .... '(A7), (activity index 140.40); and cross-disciplinary physics, (A8), (activity index, 134. 60) (Appendix-6).

Germany recorded highest activity in 'physics of elementary particles' (A1), 142.71. The other areas where research is performed more than the world average, according to the decreasing order of activity index, are: 'atomic and molecular physics, (A3) 132.63; 'condensed matter physics: electronic structure ....

'(A7), and 118.08; and 'condensed matter physics: structure .... '(A6), 111.06.

Russia, known for her interest in fusion energy, recorded highest activity index in 'fluids, plasmas, electric discharges' (A5), 212.57. The other high activity areas are: ~~'atomic and molecular physics' (A3)~~, 132.63; 'condensed matter physics: electronic structure ... '(A7), ~~118.08; 'condensed matter physics: structure .... '(A6), and 111.06; 'nuclear physics' (A2), 108.09~~.

In the UK the areas above the world average are: (1) 'cross-disciplinary physics' (A8), 112.06; (2) 'geophysics, astronomy, astrophysics' (A9), 110.30; and (3) 'classical areas of phenomenology' (A4), 109.96.

France recorded maximum activity index in 'condensed matter physics: structure ....' (A6), 119.41; followed by ~~'classical areas of phenomenology' (A4)~~, 114.53; and 'condensed matter physics: electronic structure ....' (A7), 113.96.

China, another important country from the developing world bloc, recorded the highest activity index in 'condensed matter physics: structure .....' (A6), 127.33; followed by 'classical areas of phenomenology' (A4), 122.04; and 'condensed matter physics: electronic structure .... '(A7), 120.06. Israel recorded highest activity in 'atomic and molecular physics' (A3), 124.98; ~~followed by~~ 'classical areas of phenomenology' (A4), 123.98. In Korea priority areas of research are much the same as that of Japan. It also recorded highest activity in 'condensed matter physics: structure ... '(A6), 172.14; followed by 'cross-disciplinary physics' (A8), 167.91; and 'condensed matter physics: electronic structure... '(A7), 126.10.

India recorded maximum activity index in 'condensed matter physics: electronic structure .... '(A7), 116.19; followed by 'condensed matter physics: structure .... '(A6), 109.77; 'atomic and molecular physics'(A3), 108.35; and 'geophysics, astronomy, astrophysics'(A9), 107.40 (Appendix-6).

In sum, condensed matter physics; atomic and molecular physics; and geophysics, astronomy, astrophysics are the areas of priority interest in India. Secondly, research priorities differ from country to country, even among the countries belonging to the same economic bloc.

3.5.1 Implications

Japan and USA, the leading economic powers, do not share common priorities in research. In fact research priorities of Japan are considerably different from those of USA. Whereas USA has recorded highest activity index in 'geophysics, astronomy, astrophysics'(A9), Japan accorded it the least priority. It accords top priority to 'condensed matter physics ..... ' (A6, A7), and 'cross disciplinary physics' (A8). On the contrary, the activity index of USA in these areas are on the lower side.

Such differences in the country preferences for research areas could to be attributed to disparities in the national development programmes they are pursuing. Generally, there exits invariably a strong correlation between thrust areas in research and the economic status, or industrial strength of a country. The stronger emphasis laid down by countries such as Japan and Korea on condensed matter physics and their relative

strength in the electronics-based industries illustrates the point.

For India, the thrust areas in research are : 'condensed matter physics: electronic structure ....(A6) ', 'condensed matter physics: structure .... / (A7)'. They relate to materials research. The other areas of above average activity are : 'atomic and molecular physics' (A3), 'geophysics, astronomy, astrophysics' (A9). But it needs to be seen whether such particular directions in research activity have come about as a consequence of deliberate choice, or the choices just happened. As pointed out by Prof. S Moncada, a medical researcher of repute and a foreign Fellow of the Indian National Science Academy, "the random nature of research and the lack of connection between that and the short/medium term needs of the country" is typical of Third World countries (personal communication, 10 June 1997).

3.6 *Shift in Focus*

Significant shift in the emphasis on research has been noted in most of the countries under study over the period from 1990 to 1994 (Fig 6 & 7). Appendix-8 provides data on the shift for all the countries. In the USA, the emphasis distinctly shifted towards 'geophysics, astronomy, astrophysics' (A9) -- activity index going up by 12.28 points from 119.67 in 1990 to 131.95 in 1994. Simultaneously, the emphasis declined in 'atomic and molecular physics' (A3) -- activity index dropping by 12.80 points from 115.61 in 1990 to 102.81 in 1994 (Fig 8).

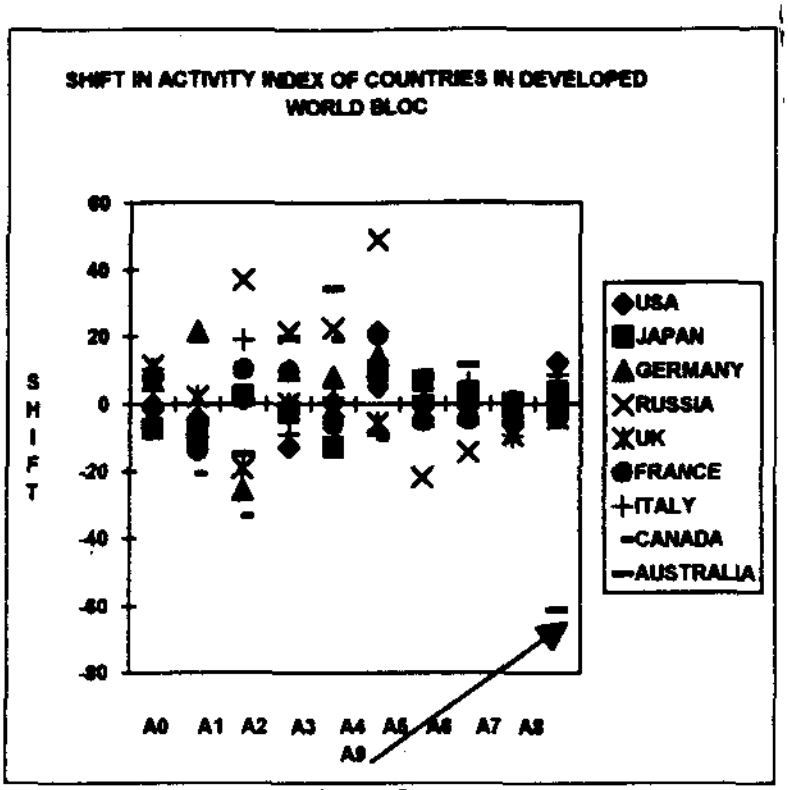
SHIFT IN ACTIVITY INDEX OF COUNTRIES IN DEVELOPED WORLD BLOC
SHIFT
60
40
20
0
-20
-40
-60
-80
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9
USA
JAPAN
GERMANY
RUSSIA
UK
FRANCE
ITALY
CANADA
AUSTRALIA

Fig. 6

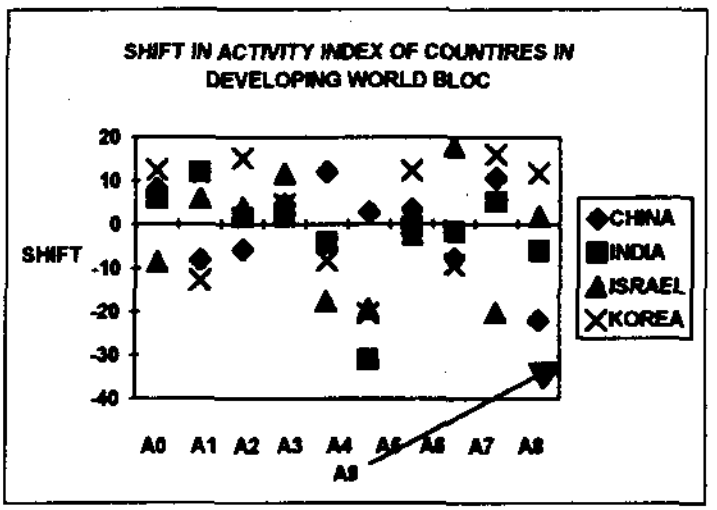
SHIFT IN ACTIVITY INDEX OF COUNTIRES IN DEVELOPING WORLD BLOC
SHIFT
20
10
0
-10
-20
-30
-40
A0 A1 A2 A3 A4 A5 A6 A7 A8
A9
CHINA
INDIA
ISRAEL
KOREA

Fig. 7

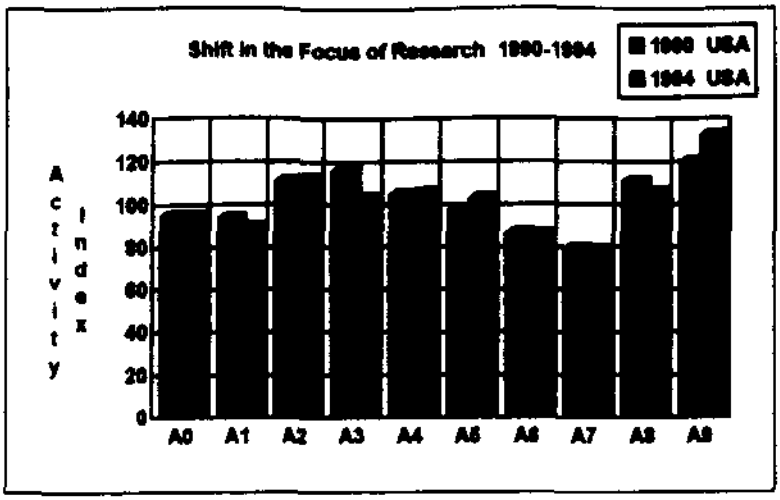

Fig. 8

Japan shows distinct shift towards three areas: 'fluids, plasmas, electric discharges'(A5), activity index going up by 9.89; 'condensed matter: structure ... A6)', activity index shooting up by 6.77; 'condensed matter: electronic structure ... (A7)' activity index shooting up by 3.30 points. (Fig 9)

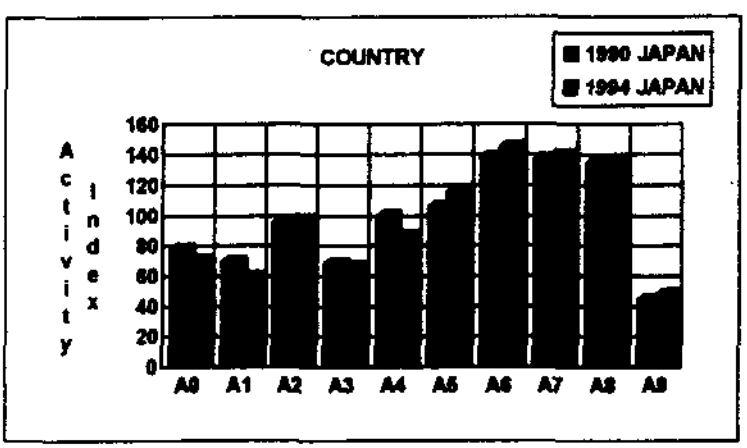

Fig. 9

Russia, France, Italy, and Korea -- all of which have active nuclear energy programmes -- show distinct shift towards 'nuclear physics'(A2). The activity index in this field increased by 36.87 for Russia, by 10.34 in France, by 18.97 for Italy, by 15.23 for Korea (Figures 10-13).

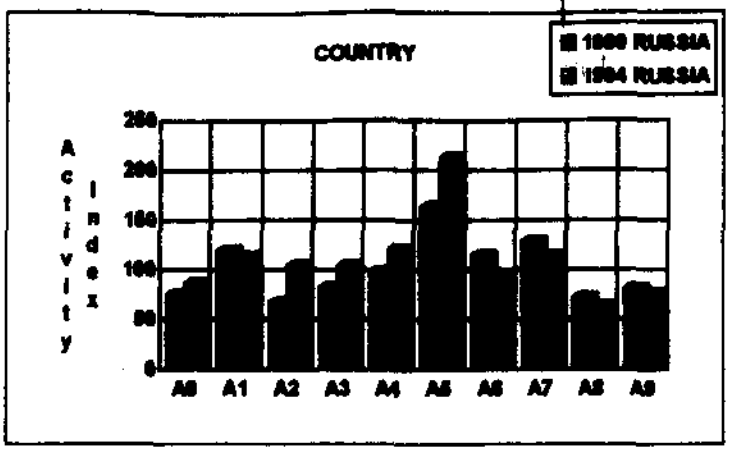

Fig. 10

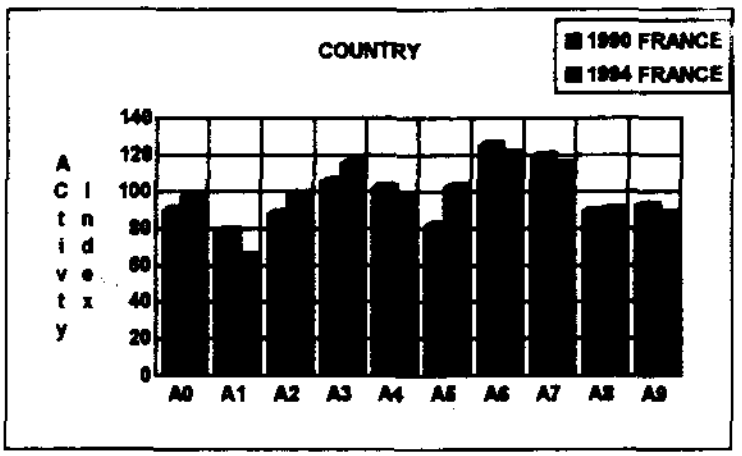

Fig . 11

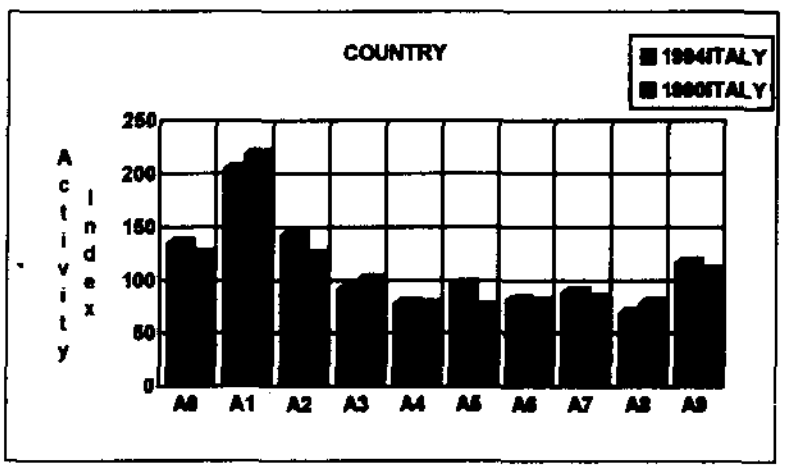

Fig. 12

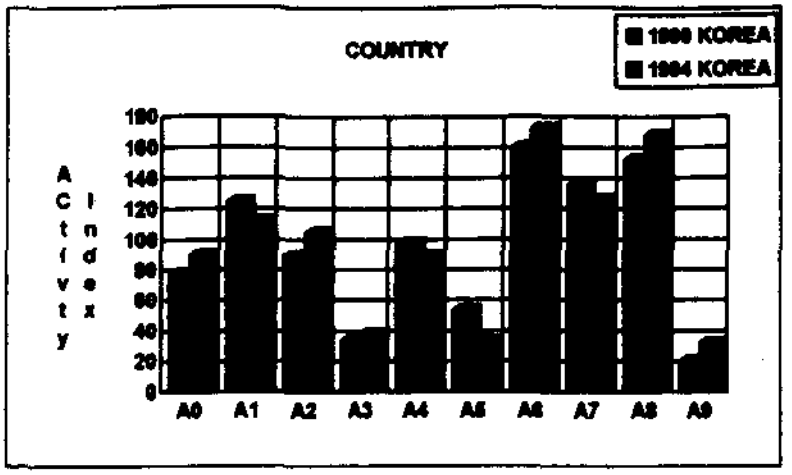

Fig. 13

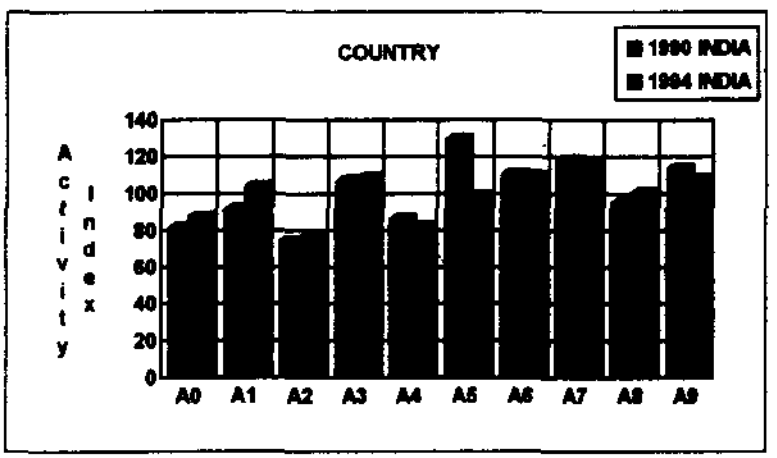

Fig. 14

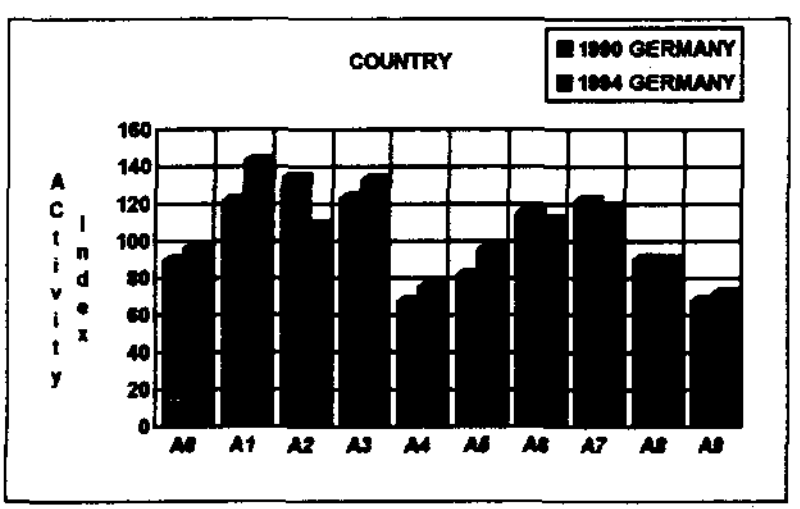

Fig. 15

India and Germany show distinct shift towards 'physics of elementary particles' (A1). The activity index

in this field went up by 11.95 for India, and by 21.39 for Germany (Fig 14, Fig. 15).

Countries from the developed world bloc, with the exception of the UK, show distinct shift towards 'fluids, plasmas, electric discharges' (A5). The activity index in this field went up by 5.29 points for USA, by 9.89 for Japan, by 14.13 for Germany, by 49.12 for Russia, by 20.59 for France, and by 21.48 for Canada. (Appendix-8)

India, China, and Korea show a perceptible shift towards 'cross-disciplinary physics' (A8), a large part of which relates to materials science. The activity index in this field increased by 10.73 for China (Fig. 16). For India it increased by 5.16 points, and for Korea by 16.02 points.

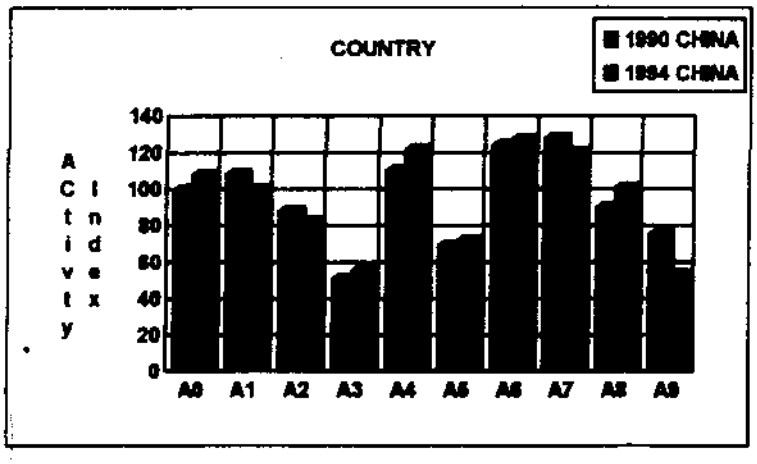

Fig. 16

Russia, China, Canada and Australia have shown increased activity in 'classical areas of phenomenology' (A4). The activity index shot up by 22.44 for Russia, by 12.07 for China, by 19.06 for Canada, and by 34.19 for Australia.

Germany, Russia, France, Italy, Australia, Israel and Korea have shown increase in research activity index in varying degrees in 'atomic and molecular physics' (A3). For Germany the increase in the activity index was 10.12, Russia 21.26, France 9.66, China, 4.56, Australia 19.48, Israel 11.62, and Korea 4.63.

Countries showing distinct rise in 'nuclear physics' (A2) studies are : Russia (36.87), France(10.34), Italy (18.97), and Korea(15.23). UK showed decline in research activity in this field by 19.09, China by 5.73, Australia by 14.82.

3.6.1 Implications of Shift in Focus

The positive shift in research efforts gives an idea of the underlying directions in which the countries intend to proceed ahead. India has shown some rise in its activity index in 'physics of elementary particles' (A1) and 'cross-disciplinary physics' (A8). On the other hand its activity index in 'fluids, plasmas, electric discharges' (A5) has declined sharply by 31.03 points. But the main question is : what proportion of such changes in research efforts has come about as a consequence of planned efforts or by deliberate choice?

'Fluids, plasmas, electric discharges' (A5) is emerging as an important field of research. Countries such as the USA, Japan, Germany, Russia, France have increased their activity in this field.

In sum, Indian research efforts are shifting towards 'physics of elementary particles' and 'cross-disciplinary physics'. Secondly, interest in 'fluids, plasmas, electric discharges' is declining.

PART B: TREATMENT GIVEN TO PHYSICS RESEARCH STUDIES IN INDIA

3.7 *India's Preferences in Physics Research Studies*

The bulk of research studies conducted in India is either experimental or theoretical. In fact the trend world over is the same; experimental type studies pile up to 52.84%, and theoretical type studies, 46.81%. In India, as per 1994 data, 52.55% of Indian contribution to physics was of the experimental type and 47.99% was of the theoretical/mathematical type. Since INSPEC classifies a paper under more than one category the sum of per cent figures is more than 100 (Fig. 17) (Appendix-10).

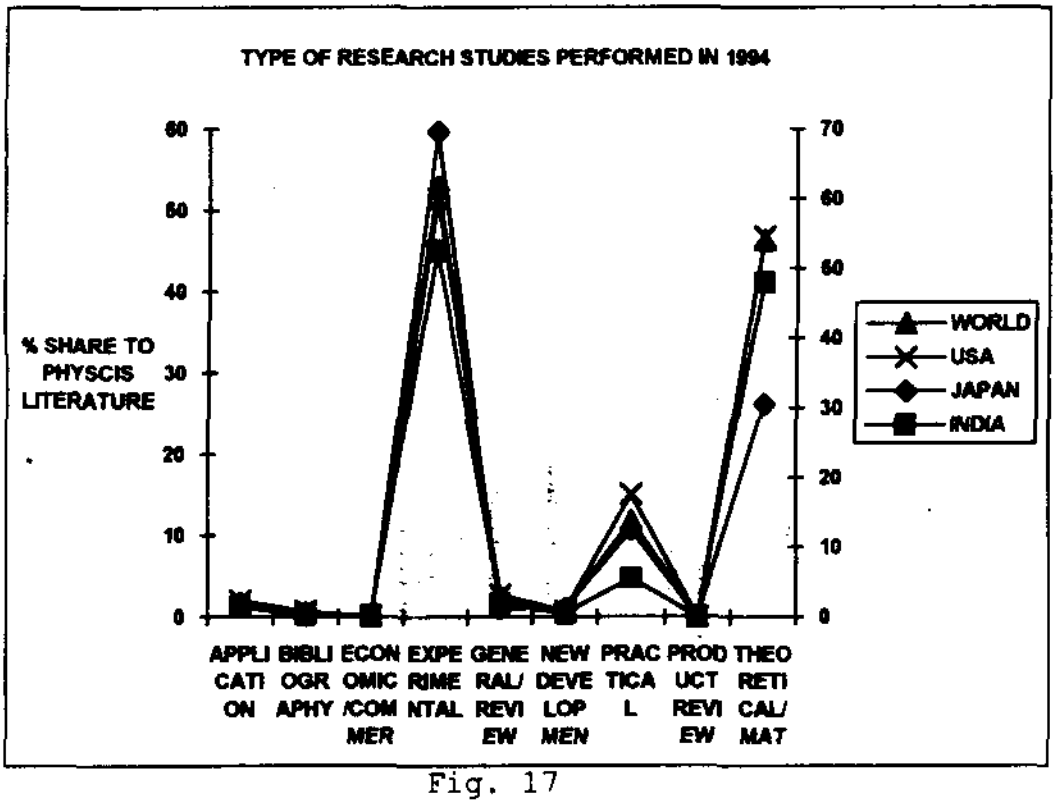

Fig. 17

Japan leads in experimental type studies, and in studies characterising new developments. On the other hand the USA leads in general/reviews type studies, and in practical type studies. 69.60% of the output from Japan was of the experimental type; the corresponding figure for India was 52.55%, whereas the world average was 52.84%. A little over 15% of US papers in 1994 were classified 'practical' type studies. 12.45% of Japanese papers, 5.51% of Indian studies, and 11.79% of the world output where also categorised under 'practical'.

India's rather low share of practical studies is intriguing and one would expect a country trying to catch up with the advanced countries in technology to carry out much more of 'practical' type work.

There has been a slight shift in the nature of studies conducted in India between 1990 and 1994. In 1990, 51.49% of India's contribution was of 'experimental' type, and this figure rose to 52.55% in 1994, up by 1.06%. Its output in theoretical studies increased from 46.55% in 1990 to 47.99% in 1994, again up by 1.44%.

Compared to the world output, India's performance in 1994 in theoretical studies was up by 1.67%, in economic/commercial studies it was up by 0.16%. In all other categories its performance was down between 0.04% and 6.28%. In new developments studies its output was down by 0.22%, in practical studies, by 6.28%, and in review type studies, by 0.49% (Appendix 9-10).

The bulk of research studies conducted in India is either experimental or theoretical. In fact the trend world over is the same.

PART C: TRENDS IN PUBLISHING INDIAN SCIENTIFIC OUTPUT

3.8 *Proportion of Indian Output going to Journals*

'Journal' is the most favored medium of reporting and publishing scientific contributions the world over. So is the trend in India. Of its combined output in 1990 and 1994, it reported as much as 87 % straight-away to journals. Over and above, 7.57 % papers which it originally reported to conferences, were eventually published in journals. Put together, the total share of its output reported in journal comes to 95.05%. The share of output going to monographs, including conference proceeding and books, is very little, just 4.96% (Fig 18) (Appendix-11).

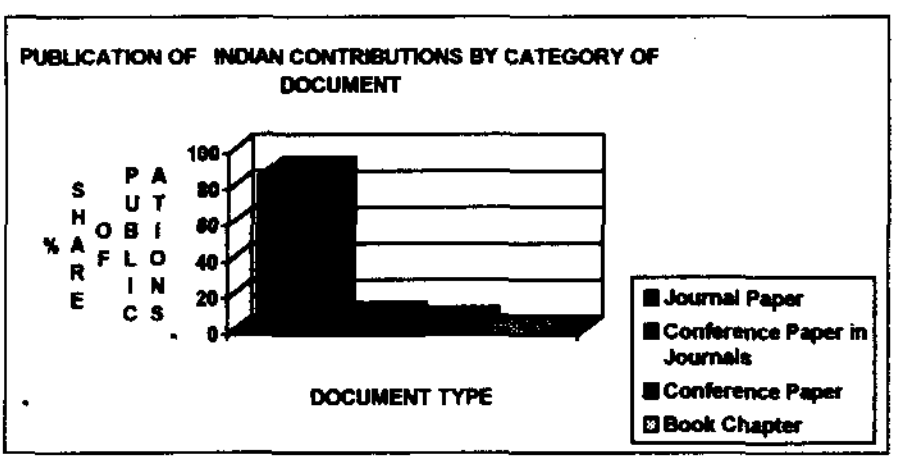

Fig. 18

95.57% of Indian output is being reported for publication in journals.

3.9 *Journals Used by Country of Publication*

Indian physicists prefer to publish in foreign journals, preferably in journals published from UK, USA, Netherlands, Germany, and Switzerland. Of its total output appearing in journals, as much as 78.56% was reported in foreign journals and the rest, 22.44% , in Indian journals (Fig. 19) (Appendix-12).

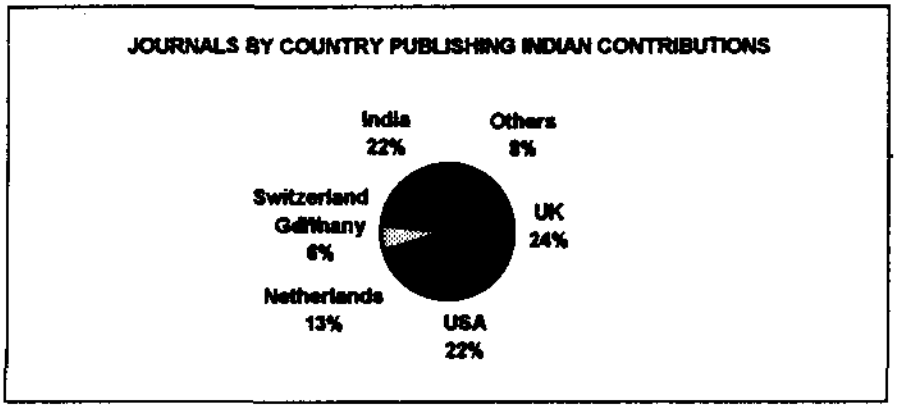

Fig. 19

Indian physicists used a total of 678 journal titles, published from over 30 countries, for reporting their contributions. These included 51 Indian journals. As much as 95% of its output was reported in journals from 8 countries alone, and the remaining 5% was reported in journals from 22 countries. The countries which shared the larger slice of the pie are UK (23.30% reported in 215 journals), India (22.44% in 53 journals), USA (21.88% in 164 journals), the Netherlands(12.97 % in 72 journals), Germany (6.14 % in 44 journals), Switzerland (4.90% in 28 journals), Singapore (2.26 % in 10 journals), and Japan (1.22 % in 12 journals). (Appendix-12)

Journals published from UK, USA, Netherlands, Germany, and Switzerland account for 70% of Indian output and the rest is accounted for by journals from India and other countries.

3.10 *Reporting of Indian Output in Journals*

Indian scientists report research papers for publication in a wide number of journals. For example, during 1990 and 1994 there were 192 journals each carrying just one paper only, 85 journals each carrying two papers only, and 48 journals each publishing three papers only. There only 66 journals each carrying more than 30 papers from India (Table 2). Presence of contributions in sufficiently large number in any important journal is indeed essential to making perceptible impact on the research community.

Table 2 : JOURNALS REPORTING INDIAN PUBLICATIONS DISTRIBUTED BY QUANTUM OF PAPERS THEY PUBLISHED
As seen from INSPEC-Physics 1990 and 1994

Country of Journal Publication	Journals Publishing A Specified # of Papers									
	1	2	3	4	5	>5 ≤10	>10 ≤20	>20 ≤30	>30	Total
UK	74	27	19	10	15	24	25	7	14	215
India	6	3	2	4	3	6	8	4	15	51
USA	52	21	11	15	6	20	16	7	16	164
Netherlands	18	4	5	3	4	14	8	7	9	72
Germany	9	5	2	5	4	9	5	1	4	44
Switzerland	4	3	3	1	1	3	6	4	3	28
Singapore	3	0	1	0	0	0	2	1	3	10
Japan	3	1	0	1	0	4	2	1	0	12
France	3	8	2	2	1	1	1	0	0	18
All Countries	192	85	48	46	36	95	76	35	66	678

There are only 66 journals which show presence of Indian papers in larger number, 30 or more.

3.11 *Ranking of Journals Used for Reporting Indian Output*

Journals used for reporting Indian contribution have been ranked in the descending order of papers they published (Appendix-13). The top 14 journals account for 25% of total Indian output. The top 50 journals account for 50% of the total output, and the top 170 journals account for 80% of the total Indian output. The distribution is typically Bradfordian.

Table 3: Top 10 Journals Reporting Indian Contributions

Title	Country	% Share	Rank
Indian Journal of Pure and Applied Physics	India	4.78	1
Pramana	India	2.69	2
Physical Review B [Condensed Matter]	USA	2.29	3
Journal of Materials Science Letters	UK	1.88	4
Indian Journal of Physics, Part B	India	1.73	5
Solid State Communications	USA	1.56	6
Journal of Applied Physics	USA	1.49	7
Astrophysics and Space Science .	Nether-lands	1.48	8
Physica Status Solidi B	Germany	1.43	9
Indian Journal of Radio & Space Physics	India	1.39	10

Table 4: Top 10 Indian Journals Reporting Indian Contributions

Title	Rank
Indian Journal of Pure and Applied Physics	1
Pramana	2
Indian Journal of Physics, Part B	3
Indian Journal of Radio & Space Physics	4
Indian Journal of Physics, Part A	5
Proceeding of the Indian National Science Academy, Part A	6
Mausam	7
Journal of the Acoustical Society of India	8
Indian Journal of Theoretical Physics	9
Current Science	10

3.12 *Presence of Indian Output in High Impact Journals*

The number of journals indexed in SCI and used for publishing Indian contributions registered a marginal increase from 359 journals in 1990 to 375 in 1994, despite the fact that there was 0.24% fall in the Indian output in 1994. Clearly, awareness among Indian researchers to publish in more visible journals has increased. Both in 1990 and 1994 they used a total of 678 journals for publishing contributions. It includes 472 *SCI* indexed journals. The remaining 206 journals are not being indexed in the *Science Citation Index* 1994.

Indian researchers publish largely in low impact factor journals such as those having impact factor between 0.001 and 1.000. In 1990 the number of such journals was 205 and in 1994 it was 219. Publishing in journals with impact factor between 1.000 and 2.000 is also not very high. The number of such journals used in 1990 was 105, and 108 in 1994. Less than 50 journals

of high impact factor (impact factor 2.000 and above) were used by Indian physicists to publish their work in the two years studied (Table 5). Quantitatively, 86% of Indian output still goes to journals with impact factor of 2.000 or less.

Table 5: DISTRIBUTION OF JOURNALS USED FOR REPORTING INDIAN OUTPUT BY IMPACT FACTOR

(JCR 1994)

As seen from INSPEC-Physics 1990 and 1994

Impact Factor Range	# of Journals		
	1990	1994	1990&1994*
> 0.0 ≤ 0.5	112	115	153
> 0.5 ≤ 1.0	93	104	124
> 1.0 ≤ 1.5	63	73	86
> 1.5 ≤ 2.0	42	35	47
> 2.0 ≤ 2.5	19	19	25
> 2.5 ≤ 3.0	11	11	13
> 3.0 ≤ 3.5	9	8	10
> 3.5 ≤ 4.0	2	3	3
> 4.0 ≤ 4.5	2	2	3
> 4.5 ≤ 5.0	0	0	0
> 5.0 ≤ 6.0	3	1	3
> 6.0 ≤ 7.0	3	3	4
> 7.0 ≤ 8.0	0	0	0
> 8.0	0	1	1
Total	359	375	472

& = Journals common to 1990 list and 1994 list counted only once

The cumulative impact of Indian contributions was used as a measure to quantify and compare the volume of publications going into *SCI* indexed journals in the two years 1990 and 1994. It is calculated by multiplying impact factor of a journal with the total number of Indian contributions made to the journal and summing up for all journals. The cumulative impact turned out to be 3597.782 for contributions made in 1990, and 4037.217 for those made in 1994 (Table 6).

This increase in the cumulative impact factor has occurred despite a large decrease in the number of papers reported in 1994. Clearly, the volume of Indian contributions going into *SCI* indexed journals has indeed increased.

Table 6: Cumulative Impact of Indian Contributions by Country of Journal Publication

COUNTRY	YEAR 1990	YEAR 1994
UK	896.753	749.075
India	127.088	100.764
USA	1288.200	1902.280
Netherlands	812.691	750.690
Germany	215.699	184.585
Switzerland	91.215	177.880
Singapore	60.354	61.080
Japan	35.704	41.172

The cumulative impact of Indian contributions was also analysed by country of journal publication. For Indian contributions going to journals from USA it (cumulative impact) rose from 1288 in 1990 to 1902 in 1994. On the other hand, for contributions appearing in UK based journals during the same periods the cumulative impact registered a drop from 896 to 749 (Fig 20, Table 6).

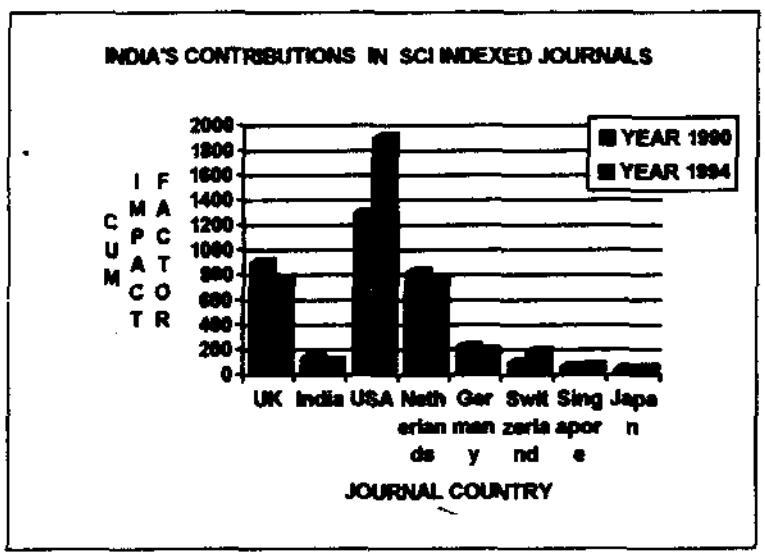

Fig. 20

Clearly Indian researchers prefer to publish more in journals from USA than from UK. This shift in their preference has taken place between 1990 to 1994. Their preference to publish in journals from other countries however remains more or less same.

The number of Indian journals used for publishing Indian contributions is 51. Of these, only 10 journals have impact factors ranging between 0.029 and 0.706. The others are not indexed in the *Science Citation Index*, 1994 (Appendix-14).

The volume of Indian contributions going into *SCI* indexed journals has indeed increased

PART D: INDIAN RESEARCH AGENCIES & GEOGRAPHIC DISTRIBUTION

3.13 *Indian Research Agencies & Their Contributions to Physics Research*

Academic institutions contribute in bulk to the Indian output in physics research. The trend is same both in 1990 and 1994. In particular, universities contributed 1649 papers in 1990, and 1490 in 1994; the institutes of higher learning contributed 870 papers in 1990, and 881 in 1994; colleges in science contributed 312 in 1990, and 216 in 1994; engineering colleges contributed 69 in 1990, and 53 in 1994.

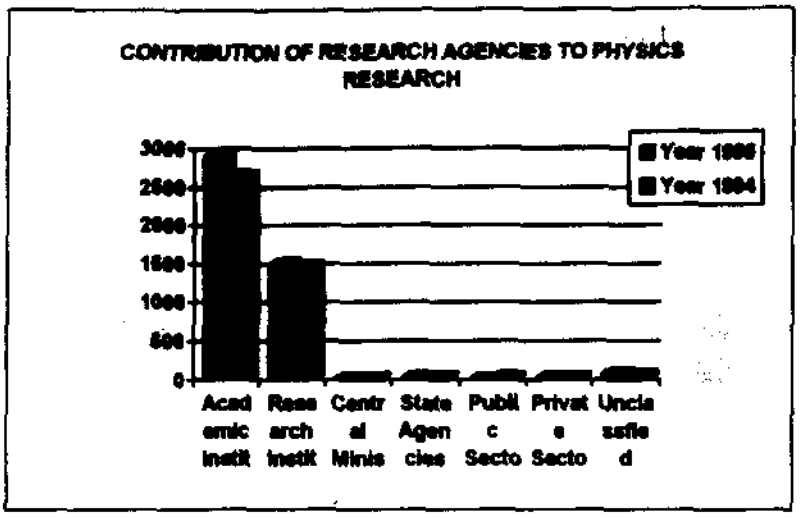

Fig. 21

Research agencies as a group rank second for their contributions to Indian output. They contributed 1488 papers in 1990 and 1454 in 1994. In category of research agencies, the Department of Atomic Energy contributed the largest share, contributing 642 papers in 1990, and 620 in 1994. The Council of Scientific and Industrial Research laboratories contributed 321 paper in 1990 and 289 in 1994. The institutions under the Department of Science & Technology contributed 315 papers in 1990 and 365 in 1994. The contribution from organisations in the public and private sector was just nominal. (Fig. 21, Table 7)

As indicated earlier, the present analysis is restricted to items published in open journals. If the literature on patents is analysed, the public/private sector organisations and CSIR would fare better than educational institutions.

Academic institutions account for the bulk to the Indian output in physics research. Research agencies as a group rank second. Organisations in the public and private sector rank third.

Table 7: CONTRIBUTION OF INDIAN RESEARCH AGENCIES TO PHYSICS RESEARCH

As seen from -INSPEC Physics, 1990 and 1994

Type of Institution	# of Papers	
	1990	1994
Academic Institutions	2900	2640
Research Institutions	1488	1454
Central Ministries	9	8
State Agencies	18	16
Public Sector industries	4	31
Private Sector industries	24	11
Unclassified	72	51
Total	4552	4211
Academic Institutions		
Universities	1649	1490
Inst. of Higher Learning	870	881
Colleges	381	269
Science & General	*312*	*216*
Engineering	*69*	*53*
Total	2900	2640
Research Institutions		
Dept. of Sci. & Technology	315	365
Dept. of Sci. & Indus. Research*	3	0
Council of Sci. & Indus. Research	321	289
Department of Electronics	0	3
Dept. of Atomic Energy	642	620
Defence Res. & Deve. Organisation	107	75
Dept. of Space	93	99
Indian Council of Agriculture Research	7	3
Total	1488	1454
Central Ministries		
Ministry of Commerce	0	1
Ministry of Environment & Forests	0	1
Ministry of Non-Conventional Energy Res.	0	2
Ministry of Human Resource Dev.	2	0
Ministry of Health & Family Plan.	1	0
Ministry of Mines	2	2
Ministry of Power	4	1
Ministry of Water Resources	0	1
Total	9	8

* Institutions other than the CSIR

Note: DST's *Directory of R&D Institutions*, 1994 was used for the classification of institutions.

3.14 *Ranking of Institutions Contributing to Research*

The total number of institutions including universities, deemed universities, institutes of higher learning, research institutions, institutions under central ministries and state ministries as well institutions under the public and private sector runs to 258. This figure does not include the colleges in science and engineering. Of these 258 institutions only 78 were responsible for contributing as much as 80% of the total output from India (Appendix-15).The 15 leading organisations in India leading in terms of number of papers published are given in Table 8.

Table 8: Leading Research Insitutions in India

Institution	Share	Rank
Bhabha Atomic Research Centre, Bombay	5.73	1
Indian Institute of Sciences, Bangalore	5.34	2
Tata Institute of Fundamental Research, Bombay	4.15	3
Indian Institute of Technology, New Delhi	3.66	4
Indian Institute of Technology, Madras	3.10	5
Banaras Hindu University, Varanasi	2.97	6
National Physical Laboratory, New Delhi	2.58	7
Jadavpur University, Calcutta	2.57	8
Indian Institute of Technology, Kharagpur	2.53	9
Indian Association for the Cultivation of Science, Calcutta	2.41	10
Indian Institute of Technology, Kanpur	2.15	11
Indian Institute of Technology, Bombay	2.11	12
University of Delhi, Delhi	1.79	13
Saha Institute of Nuclear Physics, Calcutta	1.55	14
Indira Gandhi Centre for Atomic Research, Kalpakkam	1.53	15

3.15 *Geographic Distribution*

Maharashtra, West Bengal, Delhi, Uttar Pradesh, Karnataka, Tamilnadu, Andhra Pradesh are the top seven states in the country in terms of their contributions to physics research. Put together they contribute as much as 80% of the total output from India. In particular, Maharashtra contributed 16.85%, West Bengal, 14.22%, Delhi 9.99%, and Uttar Pradesh , 9.49% (Fig 22) (Appendix-16).

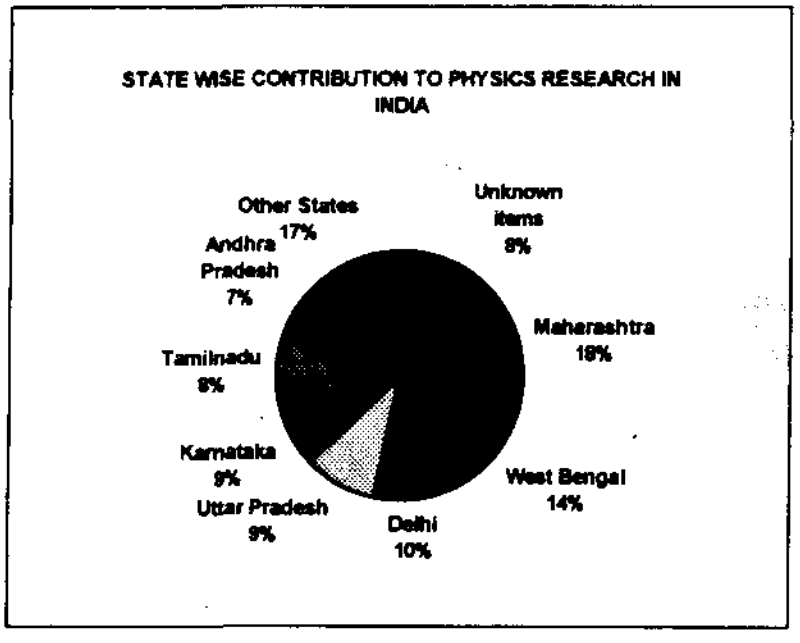

Fig. 22

The 258 institutions which contributed to the literature of physics are located in 116 cities. The city of Bombay tops the list in making highest contribution, 13.08%, followed by Delhi, 10.00%, Calcutta, 9.89%, Bangalore, 7.57%, and Madras, 4.58%. Institutions located in just about 35 cities have contributed 80% of the total output in physics. (Appendix-17)

While physics research in India is widely distributed, there are still pockets of concentration and pockets of near-vacuum. This dichotomy is not restricted to geography. Some senior scientists believe that India draws much of her scientists from a small section of the population. However, the situation is changing and many first-generation graduates are doing extremely well and some of them have even won Bhatnagar awards and Fellowships of the Academy. But this aspect is outside the purview of this study.

The states of Maharashtra, West Bengal, Delhi, Uttar Pradesh, Karnataka, Tamilnadu, Andhra Pradesh account for 80% of the total output from India.

4. CONCLUSION

This study, while following the methods of our earlier study based on *INSPEC-Physics* 1992, has extended it in at least two aspects. For one, we now have data for two years allowing us a comparison. Even so, we would like a full-scale time series analysis based on a larger set of data, and are working with six years of data, 1990 -1995.

India ranks tenth in the world for its contribution to the world literature on physics. During 1990 and 1994 its contribution declined from 2.91% to 2.66%. In general, research productivity in terms of publications is linked to the economic status of the country. The decline in the productivity in India could, therefore, be attributed to stagnation in the financial support to physics research activity. But this would need further investigations.

Materials science is the leading area of research in physics in India. Research efforts in areas such as 'condensed matter physics: structure ....'; 'condensed matter physics: electronic structure .... ' ; and (3) 'cross-disciplinary physics' are also contributing to materials research studies. In relation to the world trend, India's research efforts during 1990 and 1994 are showing a shift towards 'physics of elementary particles' and 'cross-disciplinary physics'. On the other hand interest in 'fluids, plasmas, electric discharges' has declined. Interestingly, it is emerging as an important field of research. Countries such as the USA, Japan, Germany, Russia, France have increased their activity in this field.

The bulk of research studies conducted in India is either experimental or theoretical. In fact the trend world over is the same.

Our dependence on foreign journals is still very high. For example, journals published from UK, USA, Netherlands, Germany, and Switzerland account for 70% of Indian output. Our contributions to journals are still very scanty. Presence of contributions in sufficiently large number in any important journal is indeed essential to making perceptible impact on the research community. Of the 678 journals in which India reported its papers for publication, there were only 66 journals which have carried more than 30 papers each from India. The volume of Indian contributions going into *SCI* indexed journals has increased.

Physics research enterprise is localised to a small number of institutions and to a few states. For example

just 51 institutions account for 70% of Indian output, and just seven Indian states account for 80% output. Academic institutions account for the bulk to the Indian output in physics research. Research agencies as a group rank second. The organisations in the public and private sector rank third.

4.1 *Limitations of the Study*

As indicated earlier, the present analysis is restricted to items published in open journals. Secondly, this study has not taken into account patent literature since *INSPEC-Physics* does not index the same. If the literature on patents is analysed, the public/private sector organisations and CSIR would fare better than educational institutions. The coverage of bibliographic data is limited to just two years. For accurate assessment of trends wider coverage is considered essential. The data presented in this study should therefore be interpreted in the context of these limitations.

REFERENCES

1. GLANZEL (W) and others. *Physics in the European Union in the 80's: A Scientometric study*. 1994. Information Science and Scientometric Research Unit; Hungary and Foundation for Fundamental Research on Matter; The Netherlands. 91 p.

2 ARUNACHALAM (S). Publication indicators for science in India: Based on international databases - Part 1: India's contribution to the literature of mathematics and related

fields: An analysis based on *MATSCI* 1988 - Mid 1995. 1996. Department of Science & Technology; New Delhi.

3. ARUNACHALAM (S) and others. Publication indicators for science in India: Based on international databases - Part 3: India's contribution to the literature of materials science and related fields: An analysis based on *Materials Science Citation Index* 1991-1994. 1996. Department of Science & Technology; New Delhi.

4. ARUNACHALAM (S) and DHAWAN (S M). Publication indicators for science in India: Based on international databases - Part 2: India's contribution to the literature of physics and related fields: An analysis based on *INSPEC-Physics* 1992. 1996. Department of Science & Technology; New Delhi.

5. *Indian Scientific Strengths: Some advantageous areas for increased US collaboration*: A report. 1987. National Science Foundation; Washington, D.C.

WORLD LITERATURE ON PHYSICS DISTRIBUTED BY MAJOR SUBJECT FIELDS

As seen from INSPEC-Physics, 1990 and 1994

COUNTRY	YEAR	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9	TOTAL
WORLD	1994	29246	7407	15010	11236	30867	5813	42033	39581	40698	21480	158220
WORLD	1990	26168	8407	15793	10340	28031	5819	38483	37707	37887	21519	156367
USA	1994	7533	1806	4579	3157	8854	1628	9844	8475	11718	7746	43240
USA	1990	6765	2151	4771	3272	8018	1548	9101	8151	11466	7049	42801
JAPAN	1994	2117	454	1503	758	2745	688	6254	5682	5601	1057	16177
JAPAN	1990	1925	550	1421	667	2636	580	5027	4867	4797	903	14721
GERMANY	1994	2063	776	1191	1094	1696	407	3427	3431	2655	1128	11615
GERMANY	1990	1568	686	1421	852	1263	318	2970	3070	2284	976	10517
RUSSIA	1994	1716	567	1058	792	2526	839	2641	3072	1738	1120	10743
RUSSIA	1990	2073	1062	1116	901	2902	1004	4645	5122	2874	1839	16506
UK	1994	1823	356	546	623	1944	260	2377	1840	2612	1357	9062
UK	1990	1574	366	694	531	1653	259	2052	1594	2310	1259	8319
FRANCE	1994	1449	242	746	653	1496	300	2547	2289	1851	955	8029
FRANCE	1990	1151	323	680	533	1399	232	2355	2196	1652	972	7686
CHINA	1994	1187	279	464	233	1419	157	2016	1790	1542	429	5960
CHINA	1990	883	308	470	177	1045	136	1617	1633	1154	547	5301
ITALY	1994	1223	470	664	319	742	172	1056	1082	870	777	4919
ITALY	1990	811	457	486	259	531	107	755	771	740	579	3902
CANADA	1994	855	189	332	456	962	92	927	841	1273	987	4642
CANADA	1990	650	245	465	387	661	101	765	734	1064	843	4230
INDIA	1994	679	204	302	324	672	152	1228	1224	1088	614	4211
INDIA	1990	620	224	340	321	702	219	1237	1294	1051	710	4552
AUSTRALIA	1994	438	65	72	176	592	72	421	325	541	415	2145
AUSTRALIA	1990	295	65	87	109	330	64	314	203	404	481	1716
ISRAEL	1994	338	92	66	131	357	34	292	368	335	144	1476
ISRAEL	1990	269	83	53	91	308	37	229	240	319	11	7 1214
KOREA	1994	235	74	140	38	246	17	648	447	612	61	1417
KOREA	1990	118	61	82	20	159	18	359	298	336	25	913

Note: The total is smaller than the sum of the 10 fields because many papers are classified by INSPEC under more than one field

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

COUNTRY SHARE IN THE WORLD OUTPUT BY MAJOR PHYSICS FIELDS

As Seen from INSPEC-Physics 1994

(Figures describe Per Cent of the World output in Physics Field)

COUNTRY	OUTPUT	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9
WORLD	158220	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
USA	43240	25.76	24.38	30.51	28.10	28.68	28.01	23.42	21.41	28.79	36.06
JAPAN	16177	7.24	6.13	10.01	6.75	8.89	11.84	14.88	14.36	13.76	4.92
GERMANY	11615	7.05	10.48	7.93	9.74	5.49	7.00	8.15	8.67	6.52	5.25
RUSSIA	10743	5.87	7.65	7.05	7.05	8.18	14.43	6.28	7.76	4.27	5.21
UK	9062	6.23	4.81	3.64	5.54	6.30	4.47	5.66	4.65	6.42	6.32
FRANCE	8029	4.95	3.27	4.97	5.81	4.85	5.16	6.06	5.78	4.55	4.45
CHINA	5960	4.06	3.77	3.09	2.07	4.60	2.70	4.80	4.52	3.79	2.00
ITALY	4919	4.18	6.35	4.42	2.84	2.40	2.96	2.51	2.73	2.14	3.62
CANADA	4642	2.92	2.55	2.21	4.06	3.12	1.58	2.21	2.12	3.13	4.13
INDIA	4211	2.32	2.75	2.01	2.88	2.18	2.61	2.92	3.09	2.67	2.86
AUSTRALIA	2145	1.50	0.88	0.48	1.57	1.92	1.24	1.00	0.82	1.33	1.93
ISRAEL	1476	1.16	1.24	0.44	1.17	1.16	0.58	0.69	0.93	0.82	0.67
KOREA	1417	0.80	1.00	0.93	0.34	0.80	0.29	1.54	1.13	1.50	0.28

Note : The sum of output under individual fields is more than 100 per cent since INSPEC classifies a paper under more than one field.

A0 to A9 : Description same as given under Figure 3.

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

Appendix-3

COUNTRY OUPTUT OF PUBLICATIONS BY MAJOR PHYSICS FIELDS

As seen From INSPEC-Physics 1994

(Figures describe per cent of the country output in the physics filed)

COUNTRY	OUTPUT	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9
WORLD	158220	18.48	4.68	9.49	7.10	19.51	3.67	26.57	25.02	25.72	13.58
USA	43240	17.42	4.18	10.59	7.30	20.48	3.77	22.77	19.60	27.10	17.91
JAPAN	16177	13.09	2.81	9.29	4.69	16.97	4.25	38.66	35.12	34.62	6.53
GERMANY	11615	17.76	6.68	10.25	9.42	14.60	3.50	29.50	29.54	22.86	9.71
RUSSIA	10743	15.97	5.28	9.85	7.37	23.51	7.81	24.58	28.60	16.18	10.43
UK	9062	20.12	3.93	6.03	6.87	21.45	2.87	26.23	20.30	28.32	14.97
FRANCE	8029	18.05	3.01	9.29	8.13	18.63	3.74	31.72	28.51	23.05	11.89
CHINA	5960	19.92	4.68	7.79	3.91	23.81	2.63	33.83	30.03	25.87	7.20
ITALY	4919	24.86	9.55	13.50	6.49	15.08	3.50	21.47	22.00	17.69	15.80
CANADA	4642	18.42	4.07	7.15	9.82	20.72	1.98	19.97	18.12	27.42	19.11
INDIA	4211	16.12	4.84	7.17	7.69	15.96	3.61	29.16	29.07	25.84	14.58
AUSTRALIA	2145	20.42	3.03	3.36	8.21	27.60	3.36	19.63	15.15	25.22	19.35
ISRAEL	1476	22.90	6.23	4.47	8.88	24.19	2.30	19.78	24.93	22.70	9.76
KOREA	1417	16.58	5.22	9.88	2.68	17.36	1.20	45.73	31.55	43.19	4.30

Note: The sum of 10 fields is more than 100 because some papers are classified by INSPEC under more than one field

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

INDIA'S OUTPUT DISTRIBUTED BY PHYSICS SUBFIELDS

As seen from INSPEC-Physics, 1990 and 1994

Subfields Ranked by Total Output

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share	%Cum. Total
1	A81	Materials Science	418	437	855	9.76	9.76
2	A42	Optics	173	185	358	4.09	13.84
3	A61	Structure Of Liquids And Solids Crystal...	219	135	354	4.04	17.88
4	A78	Optical Properties And Condensed Matter Spectroscopy And Other.....	204	149	353	4.03	21.91.
5	A47	Fluid Dynamics	184	157	341	3.89	25.80
6	A92	Hydrospheric And Lower Atmospheric Phys.	175	153	328	3.74	29.54
7	A52	The Physics Of Plasmas And Electric Discharges	183	107	290	3.31	32.85
8	A74	Superconductivity	124	165	289	3.30	36.15
9	A72	Electronic Transport In Condensed Matter	154	134	288	3.29	39.44
10	A86	Energy Research And Environmental Sciences	135	151	286	3.26	42.70
11	A46	Mechanics, Elasticity, Rheology	99	135	234	2.67	45.3
12	A87	Biophysics, Medical Physics, And Biomedical Engineering	93	121	214	2.44	47.81
13	A77	Dielectric Properties And Materials	101	88	189	2.16	49.9
14	A94	Aeronomy, Space Physics, And Cosmic Rays	92	89	181	2.07	52.0
15	A62	Mechanical And Acoustics Properties Of Condensed	104	76	180	2.05	54.0

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share	%Cum. Total
		Matter					
16	A75	Magnetic Properties And Materials	76	103	179	2.04	56.1
17	A03	Classical And Quantum Physics Mechanics And Fields	75	100	175	2.00	58.13
18	A33	Molecular Spectra And Interactions With Photons	85	85	170	1.94	60.0
19	A73	Electronic Structure And Electrical Properties Of Surfaces,....	86	84	170	1.94	62.0
20	A98	Stellar Systems Galactic And Extragalactic Objects And Systems....	87	80	167	1.91	63.9
21	A64	Equations Of State, Phase Equilibria, And Phase Transitions	78	80	158	1.80	65.7
22	A25	Nuclear Reactions And Scattering :Specific Reactions	89	64	153	1.75	67.4
23	A91	Solid Earth Physics	84	69	153	1.	69.2
24	A71	Electron States	74	69	143	1.	70.8
25	A68	Surfaces And Interfaces Thin Films	59	83	142	1.	72.4
26	A97	Stars	80	59	139	1.	74.0
27	A82	Physical Chemistry	67	62	129	1.	75.5
28	A11	General Theory Of Fields And Particles	72	56	128	1.46	76.9
29	A28	Nuclear Engineering And Nuclear Power Studies	60	67	127	1.45	78.4
30	A21	Nuclear Structure	53	66	119	1.	79.7
31	A34	Atomic And Molecular	50	68	118	1.35	81.1

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share	Accum. Total
		Collision Processes And Interactions					
32	A76	Magnetic Properties And Materials Condensed Matter Mossbauer Effect	71	45	116	1.32	82.4
33	A31	Theory Of Atoms And Molecules	65	50	115	1.	83.7
34	A95	Fundamental Astronomy And Astrophysics	66	44	110	1.26	85.0
35	A07	Instrumentation And Specific	54	55	109	1.24	86.27
		Instrumentation And *Techniques Of General* Use In Physics					
36	A66	Transport Properties Of Condensed Matter (Nonelectronic)	49	53	102	1.16	87.44
37	A05	Statistical Physical Physics And Thermodynamics	35	64	99	1.13	88.57
38	A12	Specific Theories And Interaction Models Particle Systematics	48	41	89	1.02	89.58
39	A29	Experimental Methods And Instrumentation For Elementary.....	51	34	85	0.97	90.55
40	A04	Relativity And Gravitation	54	27	81	0.92	91.48
41	A13	Specific Reactions And Phenomenology	47	31	78	0.89	92.37
42	A43	Acoustics	58	19	77	0.88	93.24
43	A63	Lattice Dynamics And Crystal Statistics	44	31	75	0.86	94.10

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share	%Cum. Total
44	A96	Solar System	31	41	72	0.82	94.92
45	A93	Geophysical Observations, Instrumentation And Techniques	31	34	65	0.74	95.66
46	A32	Atomic Spectra And Interactions With Photons	29	25	54	0.62	96.28
47	A65	Thermal Properties Of Condensed Matter	22	31	53	0.60	96.88
48	A79	Electron And Ion Emission By Liquids And Solids Impact Phenomena	23	20	43	0.49	97.38
49	A23	Radioactivity And Electromagnetic Transactions	21	16	37	0.42	97.80
50	A01	Communication, Education, History And Philosophy	31	3	34	0.39	98.1
51	A06	Measurement Science, General Laboratory Techniques, And.....	22	10	32	0.37	98.55
52	A41	Electricity And Magnetism Fields And Charged Particles	12	10	22	0.25	98.80
53	A36	Studies Of Special Atoms And Molecules	3	18	21	0.24	99.04
54	A24	Nuclear Reactions And Scattering:General	11	9	20	0.23	99.27
55	A67	Quantum Fluids And Solids Liquid And Solid Helium	10	6	16	0.18	99.4
56	A02	Mathematical Methods In	7	6	13	0.15	99.6

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share	%Cum. Total
		Physics Mechanics And Fields					
57	A44	Heat Flow, Thermal And Thermodynamic Processes	7	5	12	0.14	99.74
58	A35	Properties Of Atoms And Molecules Instruments And Techniques	8	3	11	0.13	99.8
59	A51	Kinetic And Transport Theory Of Fluids Physical Properties Of Gases	8	3	11	0.13	99.9
60	A14	Properties Of Specific Particles And Resonance	1	0	1	0.01	100.0
61	A27	Properties Of Specific Nuclei Listed By Mass Ranges	0	0	0	0.00	100.0
		Total	4552	4211	8763	100.0	

Appendix-5

INDIA'S OUTPUT DISTRIBUTED BY PHYSICS SUBFIELDS

As seen from INSPEC-Physics, 1990 and 1994

Arranged by Subfields

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share
1	A01	Communication, Education, History And Philosophy	31	3	34	0.39
2	A02	Mathematical Methods In Physics Mechanics And Fields	7	6	13	0.15
3	A03	Classical And Quantum Physics Mechanics And Fields	75	100	175	2.00
4	A04	Relativity And Gravitation	54	27	81	0.92
5	A05	Statistical Physical Physics And Thermodynamics	35	64	99	1.13
6	A06	Measurement Science, General Laboratory Techniques, And.....	22	10	32	0.37
7	A07	Specific Instrumentation And Techniques Of General Use In Physics	54	55	109	1.24
8	A11	General Theory Of Fields And Particles	72	56	128	1.46
9	A12	Specific Theories And Interaction Models Particle Systematics	48	41	89	1.02
10	A13	Specific Reactions And Phenomenology	47	31	78	0.89
11	A14	Properties Of Specific Particles And Resonance	1	0	1	0.01
12	A21	Nuclear Structure	53	66	119	1.
13	A23	Radioactivity And Electromagnetic Transactions	21	16	37	0.42
14	A24	Nuclear Reactions And Scattering:General	11	9	20	0.23
15	A25	Nuclear Reactions And Scattering :Specific Reactions	89	64	153	1.75
16	A27	Properties Of Specific Nuclei Listed By Mass Ranges	0	0	0	0.00
17	A28	Nuclear Engineering And	60	67	127	1.45

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share
		Nuclear Power Studies				
18	A29	Experimental Methods And Instrumentation For Elementary.....	51	34	85	0.97
19	A31	Theory Of Atoms And Molecules	65	50	115	1.
20	A32	Atomic Spectra And Interactions With Photons	29	25	54	0.62
21	A33	Molecular Spectra And Interactions With Photons	85	85	170	1.94
22	A34	Atomic And Molecular Collision Processes And Interactions	50	68	118	1.35
23	A35	Properties Of Atoms And Molecules Instruments And Techniques	8	3	11	0.13
24	A36	Studies Of Special Atoms And Molecules	3	18	21	0.24
25	A41	Electricity And Magnetism Fields And Charged Particles	12	10	22	0.25
26	A42	Optics	173	185	358	4.09
27	A43	Acoustics	58	19	77	0.88
28	A44	Heat Flow, Thermal And Thermodynamic Processes	7	5	12	0.14
29	A46	Mechanics, Elasticity, Rheology	99	135	234	2.67
30	A47	Fluid Dynamics	184	157	341	3.89
31	A51	Kinetic And Transport Theory Of Fluids Physical Properties Of Gases	8	3	11	0.13
32	A52	The Physics Of Plasmas And Electric Discharges	183	107	290	3.31
33	A61	Structure Of Liquids And Solids Crystal...	219	135	354	4.04
34	A62	Mechanical And Acoustics Properties Of Condensed Matter	104	76	180	2.05
35	A63	Lattice Dynamics And Crystal Statistics	44	31	75	0.86
36	A64	Equations Of State, Phase Equilibria, And Phase Transitions	78	80	158	1.80
37	A65	Thermal Properties Of Condensed Matter	22	31	53	0.60

.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share
38	A66	Transport Properties Of Condensed Matter (Nonelectronic)	49	53	102	1.16
39	A67	Quantum Fluids And Solids Liquid And Solid Helium	10	6	16	0.18
40	A68	Surfaces And Interfaces Thin Films	59	83	142	1.
41	A71	Electron States	74	69	143	1.
42	A72	Electronic Transport In Condensed Matter	154	134	288	3.29
43	A73	Electronic Structure And Electrical Properties Of Surfaces,....	86	84	170	1.94
44	A74	Superconductivity	124	165	289	3.30
45	A75	Magnetic Properties And Materials	76	103	179	2.04
46	A76	Magnetic Properties And Materials Condensed Matter Mossbauer Effect	71	45	116	1.32
47	A77	Dielectric Properties And Materials	101	88	189	2.16
48	A78	Optical Properties And Condensed Matter Spectroscopy And Other.....	204	149	353	4.03
49	A79	Electron And Ion Emission By Liquids And Solids Impact Phenomena	23	20	43	0.49
50	A81	Materials Science	418	437	855	9.76
51	A82	Physical Chemistry	67	62	129	1.
52	A86	Energy Research And Environmental Sciences	135	151	286	3.26
53	A87	Biophysics, Medical Physics, And Biomedical Engineering	93	121	214	2.44
54	A91	Solid Earth Physics	84	69	153	1.
55	A92	Hydrospheric And Lower Atmospheric Phys.	175	153	328	3.74
56	A93	Geophysical Observations, Instrumentation And Techniques	31	34	65	0.74
57	A94	Aeronomy, Space Physics, And Cosmic Rays	92	89	181	2.07
58	A95	Fundamental Astronomy And Astrophysics Instrumentation And	66	44	110	1.26

S.No	Sub-Filed Code	Subfield	Output 1990	Output 1994	Total Output	% Share
59	A96	Solar System	31	41	72	0.82
60	A97	Stars	80	59	139	1.5
61	A98	Stellar Systems Galactic And Extragalactic Objects And Systems....	87	80	167	1.91
Total			4552	4211	8763	100.0

Appendix-6

ACTIVITY INDEX OF SELECTED COUNTRIES IN MAJOR FIELDS OF PHYSICS

As Seen from INSPEC-Physics 1994

COUNTRY	A0	A1	A2	A3	A4	A5	A6	A7	A8	S9
WORLD	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
USA	94.25	89.22	111.63	102.81	104.96	102.48	85.70	78.35	105.36	131.95
JAPAN	70.80	59.95	97.94	65.98	86.98	115.76	145.52	140.40	134.60	48.13
GERMANY	96.09	142.71	108.09	132.63	74.85	95.38	111.06	118.08	88.87	71.53
RUSSIA	86.41	112.74	103.81	103.81	120.52	212.57	92.54	114.31	62.89	76.79
UK	108.83	83.92	63.51	96.81	109.96	78.09	98.74	81.16	112.06	110.30
FRANCE	97.63	64.38	97.94	114.53	95.51	101.70	119.41	113.96	89.63	87.61
CHINA	107.75	99.99	82.06	55.05	122.04	71.70	127.33	120.06	100.58	53.02
ITALY	134.51	204.10	142.29	91.32	77.32	95.17	80.81	87.93	68.76	116.35
CANADA	99.65	86.97	75.39	138.33	106.23	53.94	75.17	72.42	106.61	140.75
INDIA	87.23	103.48	75.60	108.35	81.80	98.25	109.77	116.19	100.45	107.40
AUSTRALIA	110.47	64.73	35.38	115.54	141.47	91.36	73.88	60.57	98.05	142.51
ISRAEL	123.89	133.14	47.13	124.98	123.98	62.70	74.47	99.66	88.24	71.86
KOREA	89.72	111.55	104.15	37.76	88.99	32.65	172.14	126.10	167.91	31.71

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

ACTIVITY INDEX OF SELECTED COUNTRIES IN MAJOR FIELDS OF PHYSICS
As Seen from INSPEC-Physics 1990

COUNTRY	A0	A1	A2	A3	A4	A5	A6	A7	A8	S9
WORLD	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
USA	94.45	93.47	110.37	115.61	104.50	97.19	86.40	78.97	110.56	119.67
RUSSIA	75.05	119.67	66.94	82.55	98.08	163.45	114.35	128.68	71.86	80.96
JAPAN	78.14	69.49	95.57	68.52	99.89	105.87	138.75	137.10	134.49	44.57
GERMANY	89.09	121.32	133.78	122.51	66.99	81.25	114.75	121.05	89.63	67.43
UK	113.06	81.83	82.60	96.53	110.84	83.66	100.23	79.46	114.60	109.97
FRANCE	89.48	78.16	87.60	104.87	101.54	81.11	124.50	118.48	88.71	91.89
CHINA	99.54	108.07	87.79	50.49	109.97	68.94	123.94	127.75	89.85	74.98
INDIA	81.39	91.53	73.95	106.64	86.03	129.28	110.42	117.88	95.29	113.34
CANADA	91.82	107.73	108.84	138.36	87.17	64.16	73.48	71.96	103.81	144.81
ITALY	124.20	217.84	123.32	100.38	75.91	73.69	78.62	81.94	78.27	107.82
AUSTRALIA	102.73	70.45	50.20	96.06	107.28	100.22	74.35	49.06	97.17	203.68
ISRAEL	132.41	127.16	43.23	113.36	141.53	81.90	76.65	81.98	108.45	70.03
KOREA	77.23	124.27	88.92	33.13	97.15	52.98	159.77	135.35	151.89	19.90

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

SHIFT IN THE ACTIVITY INDEX OF SELECTED COUNTRIES IN MAJOR FIELDS OF PHYSICS

Between 1990 and 1994

As seen from INSPEC-Physics

COUNTRY	A0	A1	A2	A3	A4	A5	A6	A7	A8	A9
USA	-0.20	-4.25	1.26	-12.80	0.46	5.29	-0.70	-0.62	-5.20	12.28
JAPAN	-7.34	-9.54	2.37	-2.54	-12.91	9.89	6.77	3.30	0.11	3.56
GERMANY	7.00	21.39	-25.69	10.12	7.86	14.13	-3.69	-2.97	-0.76	4.10
RUSSIA	11.36	-6.93	36.87	21.26	22.44	49.12	-21.81	-14.37	-8.97	-4.17
UK	-4.23	2.09	-19.09	0.28	-0.88	-5.57	-1.49	1.70	-2.54	0.33
FRANCE	8.15	-13.78	10.34	9.66	-6.03	20.59	-5.09	-4.52	0.92	-4.28
CHINA	8.21	-8.08	-5.73	4.56	12.07	2.76	3.39	-7.69	10.73	-21.96
ITALY	10.31	-13.74	18.97	-9.06	1.41	21.48	2.19	5.99	-9.51	8.53
CANADA	7.83	-20.76	-33.45	-0.03	19.06	-10.22	1.69	0.46	2.80	-4.06
INDIA	5.84	11.95	1.65	1.71	-4.23	-31.03	-0.65	-1.69	5.16	-5.94
AUSTRALIA	7.74	-5.72	-14.82	19.48	34.19	-8.86	-0.47	11.51	0.88	-61.17
ISRAEL	-8.52	5.98	3.90	11.62	-17.55	-19.20	-2.18	17.68	-20.21	1.83
KOREA	12.49	-12.72	15.23	4.63	-8.16	-20.33	12.37	9.25	16.02	11.81

A0 = General Physics, **A1** = Physics of Elementary Particles, **A2** = Nuclear Physics, **A3** = Atomic and Molecular Physics, **A4** = Classical Areas of Phenomenology, **A5** = Fluids, Plasmas, Electric Discharges, **A6** = Condensed Matter: Structure, thermal, mechanical properties, **A7** = Condensed Matter: Electronic structure, electrical magnetic and optical properties, **A8** = Cross-disciplinary physics, **A9** = Geophysics, astronomy, astrophysics

INDIA'S OUPTUT DISTRIBUTED BY RESEARCH STUDY TYPE

As seen from INSPEC-Physics, 1990

Type of Research Study	# Of Papers					Per Cent Output of Papers					Shift in India's Output w.r.t World's
	WORLD	USA	JAPAN	INDIA		WORLD	USA	JAPAN	INDIA		
APPLICATION	2170	710	279	44		1.39	1.66	1.90	0.97		-0.42
BIBLIOGRAPHY	3309	1349	132	60		2.12	3.15	0.90	1.32		-0.80
ECONOMIC/COMMERCIAL	71	28	0	3		0.05	0.07	0.00	0.07		0.02
EXPERIMENTAL	80314	21403	9826	2344		51.36	50.01	66.75	51.49		0.13
GENERAL/REVIEW	4617	1468	244	85		2.95	3.43	1.66	1.87		-1.08
NEW DEVELOPMENT	1544	460	346	24		0.99	1.07	2.35	0.53		-0.46
PRACTICAL	18283	6104	1840	254		11.69	14.26	12.50	5.58		-6.11
PRODUCT REVIEW	146	26	29	0		0.09	0.06	0.20	0.00		-0.09
THEORETICAL/MATHEMATICAL	67657	18512	4339	2119		43.27	43.25	29.47	46.55		3.28
TOTAL	156367	42801	14721	4552		100.0	100.0	100.0	100.0		

INDIA'S OUPTUT DISTRIBUTED BY RESEARCH STUDY TYPE

As seen from INSPEC-Physics, 1994

Type of Rsearch Study	# Of Papers					Per Cent of Output of Papers					Shift in India's Output w.r.t. World's
	WORLD	USA	JAPAN	INDIA		WORLD	USA	JAPAN	INDIA		
APPLICATION	2692	871	252	60		1.70	2.01	1.56	1.42		-0.28
BIBLIOGRAPHY	736	302	29	14		0.47	0.70	0.18	0.33		-0.14
ECONOMIC/COMMERCIAL	151	52	2	11		0.10	0.12	0.01	0.26		0.16
EXPERIMENTAL	83611	22253	11224	2213		52.84	51.46	69.60	52.55		-0.29
GENERAL/REVIEW	3742	1202	199	79		2.37	2.78	1.23	1.88		-0.49
NEW DEVELOPMENT	1165	338	197	22		0.74	0.78	1.22	0.52		-0.22
PRACTICAL	18659	6521	2008	232		11.79	15.08	12.45	5.51		-6.28
PRODUCT REVIEW	63	17	4	0		0.04	0.04	0.02	0.00		-0.04
THEORETICAL/MATHEMATICAL	73281	20239	4929	2021		46.32	46.81	30.56	47.99		1.67
TOTAL	158220	43240	16177	4211		100.0	100.0	100.0	100.0		

Appendix-11

INDIA'S OUTPUT IN PHYSICS DISTRIBUTED BY PUBLICATION TYPE

As seen from INSPEC-Physics, 1990 and 1994

Rank #	Type Of Publication	# Of Papers 1990	1994	Total	% Share	% Cum Total
1	Journal Paper	3829	3837	7666	87.48	87.48
2	Conference Paper in Journals	430	233	663	7.57	95.05
3	Conference Paper	292	141	433	4.94	99.99
4	Book Chapter	1	0	1	0.01	100.0
TOTAL		4552	4211	8763	100.0	

Appendix-12

INDIA'S OUTPUT RANKED BY COUNTRY OF JOURNAL PUBLICATION

As seen from INSPEC-Physics, 1990 and 1994

			# of Papers Published				
Rank	Country	# of Jnls	1990	1994	Total	% Share	% Cum Total
1	UK	215	1004	937	1941	23.30	23.30
2	India	51	1049	820	1869	22.44	45.74
3	USA	164	745	1077	1822	21.88	67.62
4	Netherlands	72	588	492	1080	12.97	80.59
5	Germany	44	277	234	511	6.14	86.73
6	Switzerland	28	221	187	408	4.90	91.63
7	Singapore	10	100	88	188	2.26	93.89
8	Japan	12	47	55	102	1.22	95.11
9	France	18	43	24	67	0.80	95.91
10	Italy	8	26	28	54	0.65	96.56
11	Sweden	3	17	29	46	0.55	97.11
12	Canada	7	28	7	35	0.42	97.53
13	Poland	7	18	13	31	0.37	97.90
14	Liechtenstei	2	27	0	27	0.32	98.22
15	Australia	5	9	15	24	0.29	98.51
16	Hungary	4	12	11	23	0.28	98.79
17	Austria	4	6	13	19	0.23	99.02
18	Croatia	2	0	13	13	0.16	99.18
19	Denmark	4	9	3	12	0.14	99.32
20	Romania	2	8	3	11	0.13	99.45
21	Czech Republic	3	10	1	11	0.13	99.58
22	Yugoslavia	2	10	0	10	0.12	99.70
23	Belgium	2	0	6	6	0.07	99.77
24	Ireland	1	0	6	60	0.07	99.84
25	Taiwan	2	1	2	3	0.04	99.88
26	Slovak Republic	1	2	1	3	0.04	99.92
27	Spain	1	2	0	2	0.02	99.94
28	Turkey	1			0	0.02	99.96
29	China	1			0	0.01	99.97
30	Finland	1			0	0.01	99.98
31	Mexico	1			0	0.01	99.99
32	Non-Journal Items		293	141	434	0.00	99.99
Total		678	4259	4070	8329	100.0	

Appendix-13

JOURNALS USED FOR REPORTING INDIAN CONTRIBUTIONS IN PHYSICS

As seen from INSPEC-Physics, 1990 and 1994

(Ranked in the Descending Order of Number of Papers)

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
1	Indian Journal of Pure and Applied Physics	India	0.229	203	195	398	4.78	4.78
2	Pramana	India	0.345	124	100	224	2.69	7.47
3	Physical Review B [Condensed Matter]	USA	3.187	60	131	191	2.29	9.76
4	Journal of Materials Science Letters	UK	0.444	78	79	157	1.88	11.64
5	Indian Journal of Physics, Part B	India	0.000	65	79	144	1.73	13.37
6	Solid State Communications	USA	1.446	69	61	130	1.56	14.93
7	Journal of Applied Physics	USA	1.658	57	67	124	1.49	16.42
8	Astrophysics and Space Science	Netherlands	0.410	88	35	123	1.48	17.90
9	Physica Status Solidi B	Germany	0.733	75	44	119	1.43	19.33
10	Indian Journal of Radio & Space Physics	India	0.075	66	50	116	1.39	20.72
11	Journal of Materials Science	UK	0.741	68	44	112	1.34	22.06
12	Indian Journal of Physics, Part A	India	0.000	62	47	109	1.31	23.37
13	Physics Letters A	Netherlands	1.228	55	46	101	1.21	24.58
14	Proceedings of the Indian National Science Academy, Part A	India	0.000	51	45	96	1.15	25.73
15	Journal of Physics: Condensed Matter	UK	1.562	49	45	94	1.13	26.86
16	Physica C	Netherlands	3.258	48	43	91	1.09	27.95
17	Chemical Physics Letters	Netherlands	2.614	53	34	87	1.04	28.99
18	Crystal Properties and Preparation	Switzerland	0.000	85	0	85	1.02	30.01

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total	% Share	% Cum. Total
19	Physica Status Solidi A	Germany	0.596	41	43	84	1.01	31.02
20	Mausam	India	0.000	49	28	77	0.92	31.94
21	Journal of the Acoustical Society of India	India	0.000	73	0	73	0.88	32.82
22	Physical Review A [Atomic, Molecular, and Optical Physics]	USA	2.292	20	53	73	0.88	33.70
23	Physical Review C [Nuclear Physics]	USA	1.842	30	40	70	0.84	34.54
24	Journal of Physics D [Applied Physics]	UK	0.879	30	29	59	0.71	35.25
25	Physical Review D [Particles and Fields]	USA	3.233	28	28	56	0.67	35.92
26	Ferroelectrics	UK	0.000	42	14	56	0.67	36.59
27	AIP Conference Proceedings	USA	0.000	1	53	54	0.65	37.24
28	Journal of Physics G [Nuclear and Particle Physics]	UK	1.142	31	23	54	0.65	37.89
29	Journal of Physics A [Mathematical and General]	UK	1.559	32	21	53	0.64	38.53
30	Crystal Research and Technology	Germany	0.308	25	28	53	0.64	39.17
31	Indian Journal of Theoretical Physics	India	0.000	35	18	53	0.64	39.81
32	Energy Conversion and Management	UK	0.290	22	30	52	0.62	40.43
33	Journal of Physics B [Atomic, Molecular and Optical Physics]	UK	2.415	22	30	52	0.62	41.05
34	Modern Physics Letters A	Singapore	1.277	23	29	52	0.62	41.67
35	Astrophysical Journal	USA	3.544	22	28	50	0.60	42.27
36	Physica B	Netherlands	1.144	31	18	49	0.59	42.86
37	Thin Solid Films	Switzerland	1.409	16	32	48	0.58	43.44
38	Journal of Sound and Vibration	UK	0.696	12	36	48	0.58	44.02
39	Materials Letters	Netherlands	0.660	26	22	48	0.58	44.60
40	Current Science	India	0.271	23	25	48	0.58	45.18
41	Computers and Structures	UK	0.265	25	22	47	0.56	45.74
42	Indian Journal of Pure and Applied	India	0.049	24	23	47	0.56	46.30

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
	Mathematics							
43	International Journal of Engineering Science	UK	0.633	24	22	46	0.55	46.85
44	*Journal of Chemical Physics*	USA	3.635	15	31	46	0.55	47.40
45	Scripta Metallurgica et Materialia	USA	0.912	16	28	44	0.53	47.93
46	Optics Communications	Netherlands	1.205	26	17	43	0.52	48.45
47	Physics Letters B	Netherlands	3.056	23	20	43	0.52	48.97
48	Modern Physics Letters B	Singapore	0.000	18	24	42	0.50	49.47
49	Physical Review Letters	USA	6.626	16	24	40	0.48	49.95
50	Applied Physics Letters	USA	3.072	18	22	40	0.48	50.43
51	Spectrochimica Acta, Part A [Molecular Spectroscopy]	UK	0.760	21	18	39	0.47	50.90
52	Journal of Astrophysics and *Astronomy*	India	0.706	28	11	39	0.47	51.37
53	Physica Scripta	Sweden	0.991	16	22	38	0.46	51.83
54	Physical Review E [Statistical Physics, Plasmas, Fluids, and Related Interdisciplinary Topics]	USA	1.888	0	37	37	0.44	52.27
55	Indian Journal of Marine Sciences	India	0.129	25	12	37	0.44	52.71
56	Reviews of Solid State Science	Singapore	0.000	36	0	36	0.43	53.14
57	Proceedings of the SPIE - The International Society for Optical Engineering	USA	0.000	18	17	35	0.42	53.56
58	Astronomy and Astrophysics	Germany	2.328	20	15	35	0.42	53.98
59	Optical Engineering	USA	0.650	3	31	34	0.41	54.39
60	Proceedings of the Indian Academy *of Sciences, Earth and Planetary* Sciences	India	0.000	20	14	34	0.41	54.80
61	Materials Chemistry and Physics	Switzerland	0.561	6	27	33	0.40	55.20
62	Journal of Solid State Chemistry	USA	1.397	10	22	32	0.38	55.58
63	Acta Ciencia Indica, Mathematics	India	0.000	12	20	32	0.38	55.96
64	Journal of Non-Crystalline Solids	Netherlands	1.072	21	10	31	0.37	56.33

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
65	Journal of the Physics and Chemistry of Solids	UK	1.350	17	14	31	0.37	56.70
66	Molecular Crystals and Liquid Crystals	UK	0.967	17	13	30	0.36	57.06
67	International Journal of Modern Physics A	Singapore	1.519	17	13	30	0.36	57.42
68	Journal of Crystal Growth	Netherlands	1.561	11	19	30	0.36	57.78
69	Journal of Magnetism and Magnetic Materials	Netherlands	1.063	11	18	29	0.35	58.13
70	Journal of Nuclear Materials	Netherlands	1.264	12	17	29	0.35	58.48
71	Materials Research Bulletin	USA	0.953	18	11	29	0.35	58.83
72	Acoustics Letters	UK	0.000	18	11	29	0.35	59.18
73	Bulletin of Materials Science	India	0.000	21	8	29	0.35	59.53
74	Bulletin of the Astronomical Society of India	India	0.000	0	28	28	0.34	59.87
75	Journal of the Physical Society of Japan	Japan	1.920	12	16	28	0.34	60.21
76	International Journal of Theoretical Physics	USA	0.345	17	10	27	0.32	60.53
77	Monthly Notices of the Royal Astronomical Society	UK	3.089	16	11	27	0.32	60.85
78	Canadian Journal of Physics	Canada	0.408	22	5	27	0.32	61.17
79	IETE Technical Review	India	0.000	10	17	27	0.32	61.49
80	Phase Transitions	UK	0.425	25	1	26	0.31	61.80
81	Journal of Optics	India	0.000	10	16	26	0.31	62.11
82	Journal of Power Sources	Switzerland	0.689	12	14	26	0.31	62.42
83	Materials Science & Engineering B [Solid-State Materials for Advanced Technology]	Switzerland	0.898	8	18	26	0.31	62.73
84	Materials Science & Engineering A [Structural Materials: Properties, Microstructure and Processing]	Switzerland	0.986	11	14	25	0.30	63.03
85	Nuclear Instruments & Methods in	Netherlands	1.188	8	17	25	0.30	63.33

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	# of Papers Total	% Share	% Cum. Total
	Physics Research, Section A [Accelerators, Spectrometers, Detectors						
86	Nuovo Cimento A	Italy	0.487	14	11	25	0.30 63.63
87	Physical Review D [Particles, Fields, Gravitation, and Cosmology]	USA	0.000	0	25	25	0.30 63.93
88	Solar Physics	Netherlands	1.254	6	17	23	0.28 64.21
89	Journal of Mathematical Physics	USA	0.969	14	9	23	0.28 64.49
90	Diffusion and Defect Data - Solid State Data, Part B [Solid State Phenomena]	Liechtenstei	0.000	23	0	23	0.28 64.77
91	Applied Optics	USA	1.033	16	7	23	0.28 65.05
92	Engineering Fracture Mechanics	UK	0.358	6	16	22	0.26 65.31
93	Hyperfine Interactions	Switzerland	0.590	10	12	22	0.26 65.57
-94	International Journal of Hydrogen Energy	UK	0.326	16	6	22	0.26 65.83
95	Physical Review A [General Physics]	USA	0.000	22	0	22	0.26 66.09
96	Nuclear Instruments & Methods in Physics Research, Section B [Beam Interactions with Materials and A	Netherlands	1.073	17	4	21	0.25 66.34
97	Nuclear Physics A	Netherlands	1.821	9	12	21	0.25 66.59
98	Review of Scientific Instruments	USA	1.095	9	12	21	0.25 66.84
99	International Journal of Energy Research	UK	0.269	19	2	21	0.25 67.09
100	Acustica	Germany	0.395	7	14	21	0.25 67.34
101	Japanese Journal of Applied Physics, Part 1 [Regular Papers & Short Notes]	Japan	0.000	9	11	20	0.24 67.58
102	Journal of Association of Exploration Geophysicists	India	0.000	19	1	20	0.24 67.82
103	Journal of Physical Chemistry	USA	3.242	8	12	20	0.24 68.06
104	Journal of Raman Spectroscopy	UK	0.950	15	5	20	0.24 68.30
105	Journal of Pure and Applied	India	0.000	19	0	19	0.23 68.53

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
	Ultrasonics							
106	Modelling, Simulation & Control B	France	0.000	19	0	19	0.23	68.76
107	International Journal of Optoelectronics	UK	0.000	1	18	19	0.23	68.99
108	Wear	Switzerland	0.580	7	12	19	0.23	69.22
109	Physics Education	India	0.000	19	0	19	0.23	69.45
110	Acta Physica Hungarica	Hungary	0.000	10	9	19	0.23	69.68
111	Indian Journal of Technology	India	0.128	16	3	19	0.23	69.91
112	Annals of Nuclear Energy	UK	0.348	10	8	18	0.22	70.13
113	Physics and Chemistry of Liquids	UK	0.536	18	0	18	0.22	70.35
114	Physics of Plasmas	USA	0.000	0	18	18	0.22	70.57
115	Semiconductor Science and Technology	UK	1.389	8	10	18	0.22	70.79
116	Journal of Geophysical Research	USA	2.305	5	13	18	0.22	71.01
117	Journal of Materials Research	USA	2.000	2	16	18	0.22	71.23
118	Journal of Mathematical and Physical Sciences	India	0.000	5	13	18	0.22	71.45
119	Journal of Plasma Physics	UK	0.615	6	12	18	0.22	71.67
120	Metallurgical Transactions A [Physical Metallurgy and Materials Science]	USA	1.460	12	5	17	0.20	71.87
121	THEOCHEM	Netherlands	0.991	2	15	17	0.20	72.07
122	Zeitschrift fur Metallkunde	Germany	0.698	10	7	17	0.20	72.27
123	Acta Ciencia Indica, Physics	India	0.000	17	0	17	0.20	72.47
124	Classical and Quantum Gravity	UK	1.652	13	4	17	0.20	72.67
125	General Relativity and Gravitation	USA	0.670	7	10	17	0.20	72.87
126	*Defence Science Journal*	India	0.000	11	5	16	0.19	73.06
127	Radiation Protection Dosimetry	UK	0.241	6	10	16	0.19	73.25
128	Solar Energy Materials and Solar Cells	Netherlands	0.667	0	16	16	0.19	73.44
129	Superconductor Science & Technology	UK	1.530	4	12	16	0.19	73.63
130	Journal of the Less-Common Metals	Switzerland	0.000	16	0	16	0.19	73.82
131	Journal of Alloys and Compounds	Switzerland	0.961	0	16	16	0.19	74.01

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
132	International Journal of Remote Sensing	UK	0.882	8	7	15	0.18	74.19
133	Journal of Modern Optics	UK	1.005	5	10	15	0.18	74.37
134	Key Engineering Materials	Switzerland	0.000	15	0	15	0.18	74.55
135	Cryogenics	UK	0.818	8	7	15	0.18	74.73
136	Europhysics Letters	Switzerland	2.662	5	10	15	0.18	74.91
137	IEEE Transactions on Plasma Science	USA	0.969	10	5	15	0.18	75.09
138	Acta Physica Polonica A	Poland	0.346	7	8	15	0.18	75.27
139	Applied Radiation and Isotopes	UK	0.534	3	12	15	0.18	75.45
140	Materials Science and Technology	UK	0.982	3	11	14	0.17	75.62
141	Pure and Applied Geophysics	Switzerland	0.288	7	7	14	0.17	75.79
142	Radiation Effects and Defects in Solids	UK	0.582	13	1	14	0.17	75.96
143	Solid State Ionics, Diffusion & Reactions	Netherlands	1.089	5	9	14	0.17	76.13
144	Zeitschrift fur Physik D [Atoms, Molecules and Clusters]	Germany	1.512	6	8	14	0.17	76.30
145	Nuclear Tracks and Radiation Measurements	UK	0.334	4	10	14	0.17	76.47
146	Optik	Germany	0.569	5	8	13	0.16	76.63
147	Physical Review A [Statistical Physics, Plasmas, Fluids, and Related Interdisciplinary Topics]	USA	0.000	13	0	13	0.16	76.79
148	Zeitschrift fur Naturforschung, Teil A [Physik, Physikalische Chemie, Kosmophysik]	Germany	0.630	7	6	13	0.16	76.95
149	Liquid Crystals	UK	1.423	9	4	13	0.16	77.11
150	International Journal of Heat and Mass Transfer	UK	0.894	10	3	13	0.16	77.27
151	International Journal of Pressure Vessels and Piping	UK	0.000	0	13	13	0.16	77.43
152	Japanese Journal of Applied Physics, Part 2 [Letters]	Japan	0.000	10	3	13	0.16	77.59

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total	% Share	% Cum. Total
153	AIAA Journal	USA	0.592	8 5	13	0.16	77.75
154	Acta Metallurgica et Materialia	USA	2.030	5 7	12	0.14	77.89
155	Composite Structures	UK	0.493	6 6	12	0.14	78.03
156	Hadronic Journal	USA	0.000	5 7	12	0.14	78.17
157	International Journal of Quantum Chemistry	USA	0.180	3 9	12	0.14	78.31
158	Journal of the American Ceramic Society	USA	1.459	7 5	12	0.14	78.45
159	Journal of the Electrochemical Society	USA	1.763	7 5	12	0.14	78.59
160	Measurement Science & Technology	UK	0.708	6 6	12	0.14	78.73
161	Renewable Energy	UK	0.000	0 12	12	0.14	78.87
162	Nuclear Physics B, Particle Physics	Netherlands	0.000	12 0	12	0.14	79.01
163	Optics and Laser Technology	UK	0.416	10 2	12	0.14	79.15
164	Solar Energy Materials	Netherlands	0.000	11 0	11	0.13	79.28
165	Transactions of the Indian Institute of Metals	India	0.000	2 9	11	0.13	79.41
166	Zeitschrift fur Physik C [Particles and Fields]	Germany	2.313	5 6	11	0.13	79.54
167	Metallurgical and Materials Transactions A [Physical Metallurgy and Materials Science]	USA	0.000	0 11	11	0.13	79.67
168	International Journal of Modern Physics B	Singapore	0.860	6 5	11	0.13	79.80
169	International Journal of Modern Physics E	Singapore	0.000	0 11	11	0.13	79.93
170	Journal of Atmospheric and Terrestrial Physics	UK	0.892	7 4	11	0.13	80.06
171	Earth, Moon, and Planets	Netherlands	0.377	6 5	11	0.13	80.19
172	Geophysical Research Letters	USA	2.145	3 8	11	0.13	80.32
173	Heat Recovery Systems & CHP	UK	0.284	4 7	11	0.13	80.45
174	Australian Journal of Physics	Australia	0.629	4 7	11	0.13	80.58
175	Boundary-Layer Meteorology	Netherlands	1.134	6 5	11	0.13	80.71

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
176	Chemical Physics	Netherlands	1.867	6	5	11	0.13	80.84
177	Annals of Physics	USA	1.979	5	5	10	0.12	80.96
178	Astronomy & Astrophysics Supplement Series	France	0.000	5	5	10	0.12	81.08
179	Corrosion Science	UK	0.556	6	4	10	0.12	81.20
180	Infrared Physics	UK	0.000	7	3	10	0.12	81.32
181	Journal of Geomagnetism and Geoelectricity	Japan	0.390	4	6	10	0.12	81.44
182	Journal of Materials Science: Materials in Electronics	UK	0.443	5	5	10	0.12	81.56
183	Journal of Mathematical Analysis and Applications	USA	0.338	6	4	10	0.12	81.68
184	Journal of Molecular Liquids	Netherlands	0.524	8	2	10	0.12	81.80
185	Journal of the Chemical Society Faraday Transactions	UK	1.560	2	8	10	0.12	81.92
186	Sadhana	India	0.041	5	5	10	0.12	82.04
187	Solid-State Electronics	UK	0.759	5	5	10	0.12	82.16
188	Waerme- und Stoffuebertragung	Germany	0.496	4	6	10	0.12	82.28
189	Optics Letters	USA	2.525	5	5	10	0.12	82.40
190	Philosophical Magazine B [Physics of Condensed Matter, Electronic, Optical and Magnetic Properties]	UK	1.625	6	4	10	0.12	82.52
191	Polymer	UK	0.905	0	10	10	0.12	82.64
192	Nuclear Physics B	Netherlands	3.722	0	9	9	0.11	82.75
193	Nuovo Cimento D	Italy	0.463	5	4	9	0.11	82.86
194	Zeitschrift fur Angewandte Mathematik und Mechanik	Germany	0.170	7	2	9	0.11	82.97
195	Journal of Molecular Structure	Netherlands	0.837	3	6	9	0.11	83.08
196	Mechanics Research Communications	UK	0.262	1	8	9	0.11	83.19
197	Journal of Applied Electrochemistry	UK	0.926	3	6	9	0.11	83.30
198	Earth and Planetary Science Letters	Netherlands	2.951	4	5	9	0.11	83.41
199	Fizika	Yugoslavia	0.000	9	0	9	0.11	83.52
200	Computers & Geosciences	UK	0.514	4	5	9	0.11	83.63

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
201	Annales Geophysicae	Germany	1.076	0	8	8	0.10	83.73
202	Applied Acoustics	UK	0.149	7	1	8	0.10	83.83
203	Applied Surface Science	Netherlands	1.144	4	4	8	0.10	83.93
204	Czechoslovak Journal of Physics	Czech Republ	0.330	7	1	8	0.10	84.03
205	Energy	UK	0.427	3	5	8	0.10	84.13
206	International Journal of Climatology	UK	0.745	3	5	8	0.10	84.23
207	International Journal of Fracture	Netherlands	0.548	4	4	8	0.10	84.33
208	International Journal of Mass Spectrometry and Ion Processes	Netherlands	2.122	3	5	8	0.10	84.43
209	Journal of Magnetic Resonance	USA	3.271	8	0	8	0.10	84.53
210	Journal of Molecular Spectroscopy	USA	1.551	2	6	8	0.10	84.63
211	Journal of the Institution of Electronics and Telecommunication Engineers	India	0.000	4	4	8	0.10	84.73
212	Journal of the Optical Society of America B [Optical Physics]	USA	2.157	2	6	8	0.10	84.83
213	Materials Transactions, JIM	Japan	0.752	3	5	8	0.10	84.93
214	Solar Energy	USA	0.739	1	7	8	0.10	85.03
215	Surface Science	Netherlands	2.745	3	5	8	0.10	85.13
216	Synthetic Metals	Switzerland	1.283	4	4	8	0.10	85.23
217	Physics of the Earth and Planetary Interiors	Netherlands	1.204	5	3	8	0.10	85.33
218	Nuclear Science and Engineering	USA	0.483	2	5	7	0.08	85.41
219	Nuclear Technology	USA	0.402	4	3	7	0.08	85.49
220	Nuovo Cimento C	Italy	0.123	1	6	7	0.08	85.57
221	Physica A	Netherlands	1.320	2	5	7	0.08	85.65
222	Physics of Fluids B [Plasma Physics]	USA	1.897	6	1	7	0.08	85.73
223	Polymer-Plastics Technology and Engineering	USA	0.326	1	6	7	0.08	85.81
224	Praktische Metallographie	Germany	0.000	3	4	7	0.08	85.89
225	Progress of Theoretical Physics	Japan	1.182	5	2	7	0.08	85.97

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
226	Revue Roumaine des Sciences Techniques, Serie de Mecanique Appliquee	Romania	0.000	4	3	7	0.08	86.05
227	Steel Research	Germany	0.551	3	4	7	0.08	86.13
228	Tectonophysics	Netherlands	1.089	7	0	7	0.08	86.21
229	Theoretical and Applied Climatology	Austria	0.357	1	6	7	0.08	86.29
230	Vacuum	UK	0.488	3	4	7	0.08	86.37
231	Journal of Vacuum Science & Technology A [Vacuum, Surfaces, and Films]	USA	1.771	6	1	7	0.08	86.45
232	Journal of the Assam Science Society	India	0.000	0	7	7	0.08	86.53
233	Journal of the Australian Mathematical Society, Series B [Applied Mathematics]	Australia	0.450	2	5	7	0.08	86.61
234	Infrared Physics & Technology	UK	0.483	0	7	7	0.08	86.69
235	International Journal for Numerical Methods in Engineering	UK	1.002	4	3	7	0.08	86.77
236	Japanese Journal of Applied Physics, Supplement	Japan	0.000	0	7	7	0.08	86.85
237	Journal of Lightwave Technology	USA	1.162	6	1	7	0.08	86.93
238	Journal of Materials Processing Technology	Netherlands	0.230	0	7	7	0.08	87.01
239	Corrosion	USA	0.467	4	3	7	0.08	87.09
240	Fizika A	Croatia	0.000	0	7	7	0.08	87.17
241	Indian Journal of Power and River Valley Development	India	0.000	4	3	7	0.08	87.25
242	Acta Mechanica	Austria	0.464	3	4	7	0.08	87.33
243	Advances in Space Research	UK	0.000	2	5	7	0.08	87.41
244	American Journal of Physics	USA	0.550	5	2	7	0.08	87.49
245	Applied Physics B [Photophysics and Laser Chemistry]	Germany	0.000	6	1	7	0.08	87.57
246	British Corrosion Journal	UK	0.000	1	6	7	0.08	87.65

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247	Computers & Mathematics with Applications	UK	0.304	3	4	7	0.08	87.73
248	Acta Crystallographica, Section A [Foundations of Crystallography]	Denmark	1.381	6	0	6	0.07	87.80
249	Acta Geophysica Polonica	Poland	0.000	4	2	6	0.07	87.87
250	Contributions to Plasma Physics	Germany	0.530	5	1	6	0.07	87.94
251	Fizika B	Croatia	0.000	0	6	6	0.07	88.01
252	Fortschritte der Physik	Germany	0.000	2	4	6	0.07	88.08
253	Indian Journal of Chemical Technology	India	0.000	0	6	6	0.07	88.15
254	International Journal for Numerical Methods in Fluids	UK	0.764	4	2	6	0.07	88.22
255	International Journal of Bio-Medical Computing	Ireland	0.576	0	6	6	0.07	88.29
256	International Journal of Engineering Fluid Mechanics	USA	0.233	6	0	6	0.07	88.36
257	Journal of Luminescence	Netherlands	1.173	4	2	6	0.07	88.43
258	Journal of the Acoustical Society of America	USA	1.273	2	4	6	0.07	88.50
259	Marine Geodesy	USA	0.000	2	4	6	0.07	88.57
260	Radio Science	USA	0.753	4	2	6	0.07	88.64
261	Sensors and Actuators B [Chemical]	Switzerland	1.074	0	6	6	0.07	88.71
262	Solar Cells	Switzerland	0.000	6	0	6	0.07	88.78
263	Zeitschrift fur Physik A [Atomic Nuclei]	Germany	0.000	6	0	6	0.07	88.85
264	Nanostructured Materials	USA	1.424	0	6	6	0.07	88.92
265	Philosophical Magazine Letters	UK	1.451	4	2	6	0.07	88.99
266	Physica Scripta Volume T	Sweden	0.000	1	5	6	0.07	89.06
267	Physics Reports	Netherlands	6.541	4	2	6	0.07	89.13
268	Planetary and Space Science	UK	0.000	5	1	6	0.07	89.20
269	Polymer Testing	UK	0.433	1	5	6	0.07	89.27
270	Proceedings of the Indian Academy of Sciences, Chemical Sciences	India	0.000	4	2	6	0.07	89.34

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total	% Share	% Cum. Total
271	Proceedings of the Royal Society of London, Series A [Mathematical and Physical Sciences]	UK	0.000	2	4 6	0.07	89.41
272	NDT&E International	UK	0.189	0	5 5	0.06	89.47
273	National Academy Science Letters	India	0.054	4	1 5	0.06	89.53
274	Nature	UK	25.466	4	1 5	0.06	89.59
275	Nonlinear Optics, Principles, Materials, Phenomena and Devices	UK	0.000	0	5 5	0.06	89.65
276	Optical and Quantum Electronics	UK	1.303	1	4 5	0.06	89.71
277	Oxidation of Metals	USA	1.550	2	3 5	0.06	89.77
278	Polymer Engineering and Science	USA	0.858	1	4 5	0.06	89.83
279	Radiation Research	USA	2.314	3	2 5	0.06	89.89
280	Solar & Wind Technology	UK	0.000	5	0 5	0.06	89.95
281	Students' Journal of the Institution of Electronics &	India	0.000	1	4 5	0.06	90.01
282	Transactions of the ASME. Journal of Applied Mechanics	USA	0.577	0	5 5	0.06	90.07
283	Zeitschrift fur Angewandte Mathematik und Physik	Switzerland	0.388	2	3 5	0.06	90.13
284	Zeitschrift fur Kristallographie	Germany	0.439	3	2 5	0.06	90.19
285	Zeitschrift fur Physik B [Condensed Matter]	Germany	2.093	4	1 5	0.06	90.25
286	Journal of Optics	France	0.400	4	1 5	0.06	90.31
287	Journal of Physics E [Scientific Instruments]	UK	0.000	5	0 5	0.06	90.37
288	Journal of Reinforced Plastics and Composites	USA	0.404	1	4 5	0.06	90.43
289	Journal of the European Ceramic Society	UK	0.760	3	2 5	0.06	90.49
290	Journal of the Institution of Engineers [India] Electronics and Telecommunication Engineering Divisi	India	0.000	1	4 5	0.06	90.55
291	Letters in Mathematical Physics	Netherlands	1.056	3	2 5	0.06	90.61

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
292	Mathematical and Computer Modelling	UK	0.286	4	1	5	0.06	90.67
293	Molecular Physics	UK	1.923	2	3	5	0.06	90.73
294	International Communications in Heat and Mass Transfer	UK	0.282	2	3	5	0.06	90.79
295	International Journal of Electronics	UK	0.258	5	0	5	0.06	90.85
296	International Journal of Mechanical Sciences	UK	0.610	3	2	5	0.06	90.91
297	Journal of Magnetic Resonance, Series A	USA	1.555	0	5	5	0.06	90.97
298	Journal of Membrane Science	Netherlands	1.492	2	3	5	0.06	91.03
299	Electronics Letters	UK	1.159	3	2	5	0.06	91.09
300	Fluid Dynamics Research	Netherlands	0.313	4	1	5	0.06	91.15
301	Geophysical Journal International	UK	1.371	2	3	5	0.06	91.21
302	Gerlands Beitraege zur Geophysik	Germany	0.000	5	0	5	0.06	91.27
303	High Performance Polymers	UK	0.000	0	5	5	0.06	91.33
304	Acta Physica Polonica B	Poland	0.536	4	1	5	0.06	91.39
305	Applied Physics A [Solids and Surfaces]	Germany	1.578	4	1	5	0.06	91.45
306	Ceramics International	Italy	0.362	3	2	5	0.06	91.51
307	*Computer Physics Communications*	*Netherlands*	*1.566*	4	1	5	*0.06*	91.57
308	Annalen der Physik	Germany	0.000	4	0	4	0.05	91.62
309	Astrophysical Journal, Letters	USA	0.000	3	1	4	0.05	91.67
310	Composites Science and Technology	UK	0.906	2	2	4	0.05	91.72
311	*Diffusion and Defect Data - Solid* State Data, Part A [Defect and Diffusion Forum]	*Liechtenstein*	*0.000*	4	0	4	*0.05*	91.77
312	Electromyography and Clinical Neurophysiology	Belgium	0.000	0	4	4	0.05	91.82
313	Experiments in Fluids	Germany	0.518	0	4	4	0.05	91.87
314	Ferroelectrics Letters Section	UK	0.318	1	3	4	0.05	91.92
315	Fusion Technology	USA	0.683	3	1	4	0.05	91.97
316	Health Physics	UK	0.906	2	2	4	0.05	92.02

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317	IEEE Journal of Quantum Electronics	USA	1.610	2	2	4	0.05	92.07
318	IEEE Transactions on Electron Devices	USA	1.630	1	3	4	0.05	92.12
319	IEEE Transactions on Instrumentation and Measurement	USA	0.402	0	4	4	0.05	92.17
320	Indian Journal of Engineering and Materials Sciences	India	0.000	0	4	4	0.05	92.22
321	International Journal of Fatigue	UK	0.462	1	3	4	0.05	92.27
322	Journal of Computational Physics	USA	1.084	0	4	4	0.05	92.32
323	Journal of Electron Spectroscopy and Related Phenomena	Netherlands	1.274	3	1	4	0.05	92.37
324	Journal of Nuclear Science and Technology	Japan	0.446	2	2	4	0.05	92.42
325	Journal of Optical Communications	Germany	0.000	3	1	4	0.05	92.47
326	Journal of Polymer Science, Part B [Polymer Physics]	USA	1.350	2	2	4	0.05	92.52
327	Journal of Quantitative Spectroscopy and Radiative Transfer	UK	1.600	3	1	4	0.05	92.57
328	Journal of Statistical Physics	USA	0.000	2	2	4	0.05	92.62
329	Journal of Superconductivity	USA	1.360	0	4	4	0.05	92.67
330	Journal of the American Chemical Society	USA	5.039	3	1	4	0.05	92.72
331	Journal of the Electrochemical Society of India	India	0.000	1	3	4	0.05	92.77
332	Journal of the Institution of Engineers [India], Metallurgy & Material Science Division	India	0.000	4	0	4	0.05	92.82
333	Journal of the Optical Society of America A [Optics and Image Science]	USA	1.425	2	2	4	0.05	92.87
334	Materials Characterization	USA	0.366	1	3	4	0.05	92.92
335	Materials Forum	Australia	0.291	2	2	4	0.05	92.97

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336	Meteorology and Atmospheric Physics	Austria	0.645	1 3	4	0.05	93.02
337	Microelectronics Journal	UK	0.414	3 1	4	0.05	93.07
338	Modelling, Measurement & Control B	France	0.000	0 4	4	0.05	93.12
339	Revue Roumaine de Physique	Romania	0.000	4 0	4	0.05	93.17
340	Revue de Physique Appliquee	France	0.000	4 0	4	0.05	93.22
341	Scripta Metallurgica	USA	0.000	4 0	4	0.05	93.27
342	Surface and Coatings Technology	Switzerland	0.901	2 2	4	0.05	93.32
343	Theoretica Chimica Acta	Germany	1.750	2 2	4	0.05	93.37
344	Transactions of the ASME. Journal of Heat Transfer	USA	0.960	3 1	4	0.05	93.42
345	Ultra Scientist of Physical Sciences	India	0.000	0 4	4	0.05	93.47
346	Zeitschrift fur Physik A [Hadrons and Nuclei]	Germany	1.326	0 4	4	0.05	93.52
347	Nuclear Engineering and Design	Netherlands	0.111	2 2	4	0.05	93.57
348	Nuclear Physics B, Proceedings Supplements	Netherlands	0.000	4 0	4	0.05	93.62
349	Optics and Lasers in Engineering	UK	0.310	4 0	4	0.05	93.67
350	Philosophical Magazine A [Physics of Condensed Matter, Defects and Mechanical Properties]	UK	1.493	2 2	4	0.05	93.72
351	Physics and Chemistry of Glasses	UK	1.000	4 0	4	0.05	93.77
352	Physics in Medicine and Biology	UK	1.386	3 1	4	0.05	93.82
353	Publications of the Astronomical Society of the Pacific	USA	1.497	2 2	4	0.05	93.87
354	Numerical Heat Transfer, Part A [Applications]	UK	0.779	0 3	3	0.04	93.91
355	Nuovo Cimento B	Italy	0.305	1 2	3	0.04	93.95
356	Physics of Fluids A [Fluid Dynamics]	USA	1.182	3 0	3	0.04	93.99
357	Plasma Physics and Controlled Fusion	UK	2.056	3 0	3	0.04	94.03
358	Plastics and Rubber Processing and	UK	0.000	3 0	3	0.04	94.07

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	1994	Total	% Share	% Cum. Total
	Applications							
359	Plating and Surface Finishing	USA	0.122	0	3	3	0.04	94.11
360	Powder Metallurgy International	Germany	0.311	3	0	3	0.04	94.15
361	Proceedings of the Indian Academy of Sciences, Mathematical Sciences	India	0.000	1	2	3	0.04	94.19
362	Radiation Measurements	UK	0.000	0	3	3	0.04	94.23
363	Superlattices and Microstructures	UK	0.760	3	0	3	0.04	94.27
364	Theoretical and Applied Fracture Mechanics	Netherlands	0.167	2	1	3	0.04	94.31
365	Transactions of the ASME. Journal of Engineering Materials and Technology	USA	0.390	0	3	3	0.04	94.35
366	Transactions of the American Nuclear Society	USA	0.000	3	0	3	0.04	94.39
367	Vibrational Spectroscopy	Netherlands	1.098	0	3	3	0.04	94.43
368	Journal of Radioanalytical and Nuclear Chemistry, Letters	Switzerland	0.408	2	1	3	0.04	94.47
369	Journal of the Atmospheric Sciences	USA	1.721	1	2	3	0.04	94.51
370	Journal of the Institution of Engineers [India], Interdisciplinary Panels	India	0.000	3	0	3	0.04	94.55
371	Medical & Biological Engineering & Computing	UK	0.599	1	2	3	0.04	94.59
372	Microelectronics and Reliability	UK	0.152	1	2	3	0.04	94.63
373	Molecular Crystals and Liquid Crystals Letters Section	UK	0.000	3	0	3	0.04	94.67
374	Molecular Materials	UK	0.000	0	3	3	0.04	94.71
375	International Journal of Bifurcation and Chaos in Applied Sciences and Engineering	Singapore	0.000	0	3	3	0.04	94.75
376	International Journal of Heat and Fluid Flow	USA	0.653	0	3	3	0.04	94.79

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	# of Papers Total	% Share	% Cum. Total
377	International Journal of Mathematical Education in Science & Tech.	UK	0.000	2	1 3	0.04	94.83
378	Journal de Physique IV [Colloque]	France	0.000	0	3 3	0.04	94.87
379	Journal of Biomechanics	UK	1.548	1	2 3	0.04	94.91
380	Journal of Climate	USA	2.735	2	1 3	0.04	94.95
381	Journal of Composite Materials	USA	0.833	2	1 3	0.04	94.99
382	Journal of Low Temperature Physics	USA	1.213	3	0 3	0.04	95.03
383	Engineering Computations	UK	1.286	1	2 3	0.04	95.07
384	European Journal of Physics	UK	0.000	3	0 3	0.04	95.11
385	Fatigue & Fracture of Engineering Materials & Structures	UK	0.423	0	3 3	0.04	95.15
386	Geophysics	USA	0.824	2	1 3	0.04	95.19
387	Helvetica Physica Acta	Switzerland	0.657	3	0 3	0.04	95.23
388	High Pressure Research	Switzerland	0.000	0	3 3	0.04	95.27
389	Acta Physica Slovaca	Slovak Repub	0.000	2	1 3	0.04	95.31
390	Applied Scientific Research	Netherlands	0.273	3	0 3	0.04	95.35
391	Atmospheric Environment, Part A [General Topies]	UK	1.310	3	0 3	0.04	95.39
392	Biophysical Journal	USA	4.247	1	2 3	0.04	95.43
393	British Ceramic Transactions	UK	0.170	0	3 3	0.04	95.47
394	British Journal of Non-Destructive Testing	UK	0.147	2	1 3	0.04	95.51
395	Canadian Journal of Chemical Engineering	Canada	0.538	3	0 3	0.04	95.55
396	Celestial Mechanics and Dynamical Astronomy	Netherlands	0.000	2	1 3	0.04	95.59
397	Chemical Engineering Science	UK	0.902	3	0 3	0.04	95.63
398	Colloque de Physique	France	0.000	3	0 3	0.04	95.67
399	Communications in Mathematical Physics	Germany	2.228	1	2 3	0.04	95.71
400	Computer Methods in Applied Mechanics and Engineering	Netherlands	1.018	0	3 3	0.04	95.75
401	Computers & Chemistry	UK	1.380	1	2 3	0.04	95.79

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total		% Share	% Cum. Total
402	Acta Astronautica	UK	0.099	1	1	2	0.02	95.81
403	Acta Crystallographica, Section B [Structural Science]	Denmark	1.507	2	0	2	0.02	95.83
404	Acta Crystallographica, Section D [Biological Crystallography]	Denmark	2.746	0	2	2	0.02	95.85
405	Acta Technica CSAV	Czech Republ	0.000	2	0	2	0.02	95.87
406	Annales Geophysicae. Atmospheres, Hydrospheres and Space Sciences	France	0.000	2	0	2	0.02	95.89
407	Applied Energy	UK	0.309	0	2	2	0.02	95.91
408	Astrophysical Journal Supplement Series	USA	3.140	2	0	2	0.02	95.93
409	Atti della Fondazione Giorgio Ronchi	Italy	0.000	2	0	2	0.02	95.95
410	Bollettino di Geofisica Teorica ed Applicada	Italy	0.000	0	2	2	0.02	95.97
411	Chaos, Solitons and Fractals	UK	0.000	0	2	2	0.02	95.99
412	Chemistry of Materials	USA	2.697	1	1	2	0.02	96.01
413	Chinese Journal of Physics	Taiwan	0.300	0	2	2	0.02	96.03
414	Composites Engineering	UK	0.444	0	2	2	0.02	96.05
415	Continental Shelf Research	UK	1.101	1	1	2	0.02	96.07
416	Cybernetica	Belgium	0.106	0	2	2	0.02	96.09
417	Deep-Sea Research, Part A [Oceanographic Research Papers]	UK	0.000	2	0	2	0.02	96.11
418	Diamond and Related Materials	Switzerland	2.017	0	2	2	0.02	96.13
419	Doga Turkish Journal of Physics	Turkey	0.000	0	2	2	0.02	96.15
420	Electrical India	India	0.000	2	0	2	0.02	96.17
421	Experimental Techniques	USA	0.000	2	0	2	0.02	96.19
422	Geochimica et Cosmochimica Acta	UK	2.831	1	1	2	0.02	96.21
423	Geophysical Prospecting	Netherlands	0.452	2	0	2	0.02	96.23
424	Geophysical Transactions	Hungary	0.000	1	1	2	0.02	96.25
425	High Temperature Technology	UK	0.000	2	0	2	0.02	96.27
426	High Temperatures - High Pressures	UK	0.000	2	0	2	0.02	96.29
427	Hydrological Processes	UK	0.697	1	1	2	0.02	96.31

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
428	IEEE Transactions on Geoscience and Remote Sensing	USA	1.356	1	1	2	0.02	96.33
429	IEEE Transactions on Nuclear Science	USA	1.183	0	2	2	0.02	96.35
430	Icarus	USA	1.899	2	0	2	0.02	96.37
431	Ingenieur-Archiv	Germany	0.000	2	0	2	0.02	96.39
432	International Journal of Ambient Energy	UK	0.000	1	1	2	0.02	96.41
433	International Journal of Multiphase Flow	UK	0.755	0	2	2	0.02	96.43
434	International Journal of Non-Linear Mec	UK	0.000	1	1	2	0.02	96.45
435	International Journal of Radiation Biology	UK	2.761	1	1	2	0.02	96.47
436	International Journal of Radiation Oncology Biology Physics	UK	2.321	1	1	2	0.02	96.49
437	International Journal of Radioactive Materials Transport	UK	0.000	1	1	2	0.02	96.51
438	International Journal of Self-Propagating High-Temperature Synthesis	USA	0.000	0	2	2	0.02	96.53
439	International Journal of Solar Energy	Switzerland	0.000	1	1	2	0.02	96.55
440	International Journal of Solids and Structures	UK	0.732	1	1	2	0.02	96.57
441	Journal de Physique	France	0.000	2	0	2	0.02	96.59
442	Journal de Physique I [General Physics, Statistical Physics, Condensed Matter, Cross-Disciplinary Ph	France	0.000	0	2	2	0.02	96.61
443	Journal de Physique III [Applied Physics, Materials Science, Fluids, Plasma and Instrumentation]	France	0.000	0	2	2	0.02	96.63
444	Journal of Acoustic Emission	USA	0.000	1	1	2	0.02	96.65

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	1994	Total	% Share	% Cum. Total
445	Journal of Aerosol Science	UK	1.597	0	2	2	0.02	96.67
446	Journal of Applied Crystallography	Denmark	1.951	1	1	2	0.02	96.69
447	Journal of Biomedical Engineering	UK	0.700	2	0	2	0.02	96.71
448	Journal of Coastal Research	USA	0.588	2	0	2	0.02	96.73
449	Journal of Environmental Radioactivity	UK	0.505	1	1	2	0.02	96.75
450	Journal of Macromolecular Science - Physics	USA	0.760	2	0	2	0.02	96.77
451	Journal of Materials Engineering	USA	0.000	2	0	2	0.02	96.79
452	Journal of Materials Engineering and Performance	USA	0.150	0	2	2	0.02	96.81
453	Journal of Physics of the Earth	Japan	0.000	1	1	2	0.02	96.83
454	Journal of Testing and Evaluation	USA	0.243	0	2	2	0.02	96.85
455	Journal of the Indian Institute of Science	India	0.000	2	0	2	0.02	96.87
456	Journal of the Institution of Engineers [India] Electrical Engg Div.	India	0.000	1	1	2	0.02	96.89
457	Journal of the Optical Society of America A [Optics, Image Science and Vision]	USA	0.000	0	2	2	0.02	96.91
458	Lanthanide and Actinide Research	Netherlands	0.000	2	0	2	0.02	96.93
459	Materials & Design	UK	0.000	0	2	2	0.02	96.95
460	Metrologia	France	0.906	0	2	2	0.02	96.97
461	Microwave and Optical Technology Letters	USA	0.320	2	0	2	0.02	96.99
462	Modelling, Measurement & Control A	France	0.000	0	2	2	0.02	97.01
463	Modelling, Simulation & Control A	France	1.379	2	0	2	0.02	97.03
464	Modelling, Simulation & Control C	France	0.000	2	0	2	0.02	97.05
465	Radiation and Environmental Biophysics	Germany	0.873	0	2	2	0.02	97.07
466	Rapid Communications in Mass Spectrometry	UK	2.484	0	2	2	0.02	97.09
467	Sensors and Actuators A [Physical]	Switzerland	0.704	1	1	2	0.02	97.11

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total	% Share	% Cum. Total
468	Space Science Reviews	Netherlands	0.876	1	1 2	0.02	97.13
469	Spectroscopy Letters	USA	0.341	1	1 2	0.02	97.15
470	Speculations in Science and Technology	UK	0.000	0	2 2	0.02	97.17
471	Tellus, Series B [Chemical and Physical Meteorology]	Sweden	2.047	0	2 2	0.02	97.19
472	Transactions of the ASME. Journal of Solar Energy Engineering	USA	0.506	0	2 2	0.02	97.21
473	Transactions of the ASME. Journal of Tribology	USA	0.427	1	1 2	0.02	97.23
474	Transactions of the ASME. Journal of Vibration and Acoustics	USA	0.219	0	2 2	0.02	97.25
475	Waste Management	UK	0.313	0	2 2	0.02	97.27
476	Werkstoffe und Korrosion	Germany	0.277	2	0 2	0.02	97.29
477	Zeitschrift fur Physikalische Chemie	Germany	0.000	1	1 2	0.02	97.31
478	Nonlinear Analysis Theory, Methods & Applications	UK	0.380	1	1 2	0.02	97.33
479	Optica Applicata	Poland	0.053	2	0 2	0.02	97.35
480	Optica Pura y Aplicada	Spain	0.000	2	0 2	0.02	97.37
481	Physica D	Netherlands	2.070	2	0 2	0.02	97.39
482	Physics and Chemistry of Minerals	Germany	1.730	2	0 2	0.02	97.41
483	Physics of Fluids	USA	0.000	0	2 2	0.02	97.43
484	Plasma Chemistry and Plasma Processing	USA	1.380	1	1 2	0.02	97.45
485	Plastics, Rubber and Composites Processing and Applications	UK	0.400	0	2 2	0.02	97.47
486	Progress in Crystal Growth and Characterization of Materials	UK	0.688	0	2 2	0.02	97.49
487	Natural Resources Forum	UK	0.000	0	1 1	0.01	97.50
488	Nonlinearity	UK	1.474	1	0 1	0.01	97.51
489	Nuclear Engineering International	UK	0.084	1	0 1	0.01	97.52
490	Nuclear Safety	USA	0.104	1	0 1	0.01	97.53

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491	Observatory	UK	0.636	1	0	1	0.01	97.54
492	Opsearch	India	0.000	1	0	1	0.01	97.55
493	Optical Materials	Netherlands	1.086	0	1	1	0.01	97.56
494	Parallel Computing	Netherlands	0.420	0	1	1	0.01	97.57
495	Parallel Processing Letters	Singapore	0.000	0	1	1	0.01	97.58
496	Pattern Recognition Letters	Netherlands	0.000	1	0	1	0.01	97.59
497	Philosophical Transactions of the Royal Society of London A [Mathematical and Physical Sciences]	UK	1.547	1	0	1	0.01	97.60
498	Philosophical Transactions of the Royal Society, Series A [Physical Sciences and Engineering]	UK	2.190	0	1	1	0.01	97.61
499	Photogrammetric Engineering and Remote Sensing	USA	0.538	0	1	1	0.01	97.62
500	Physical Review A [Atomic, Molecular, and Optical Thysics]	USA	0.000	1	0	1	0.01	97.63
501	Physice Status Solidi A	Germany	0.596	1	0	1	0.01	97.64
502	Physics Essays	Canada	0.039	0	1	1	0.01	97.65
503	Phywics Letters A	Netherlands	0.000	1	0	1	0.01	97.66
504	Plasma Sources, Science and Technology	UK	0.000	0	1	1	0.01	97.67
505	Powder Metallurgy	UK	0.377	1	0	1	0.01	97.68
506	Proceedings of the Astronomical Society of Australia	Australia	0.000	0	1	1	0.01	97.69
507	Progress in Biophysics & Molecular Biology	UK	6.115	0	1	1	0.01	97.70
508	Progress in Materials Science	UK	3.385	0	1	1	0.01	97.71
509	Progress in Nuclear Energy	UK	0.000	0	1	1	0.01	97.72
510	Progress in Nuclear Magnetic Resonance Spectroscopy	UK	5.750	1	0	1	0.01	97.73
511	Progress in Quantum Electronics	UK	1.818	1	0	1	0.01	97.74
512	Publications of the Astronomical Society of Japan	Japan	2.046	1	0	1	0.01	97.75

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	1994	Total	% Share	% Cum. Total
513	Pure and Applied Optics	UK	0.000	0	1	1	0.01	97.76
514	Quantum Optics	UK	1.400	1	0	1	0.01	97.77
515	Quarterly Journal of Mechanics and Applied Mathematics	UK	0.658	0	1	1	0.01	97.78
516	Quarterly Journal of the Royal Meteorological Society	UK	1.815	1	0	1	0.01	97.79
517	Radiation Physics and Chemistry	UK	0.395	1	0	1	0.01	97.80
518	Remote Sensing of Environment	USA	1.695	1	0	1	0.01	97.81
519	Reports on Mathematical Physics	UK	0.000	0	1	1	0.01	97.82
520	Reports on Progress in Physics	UK	6.727	1	0	1	0.01	97.83
521	Reviews in Mathematical Physics	Singapore	0.000	0	1	1	0.01	97.84
522	Revista Mexicana de Fisica	Mexico	0.198	0	1	1	0.01	97.85
523	Rheologica Acta	Germany	1.313	1	0	1	0.01	97.86
524	Scandinavian Journal of Metallurgy	Finland	0.122	0	1	1	0.01	97.87
525	Science Progress	UK	0.516	1	0	1	0.01	97.88
526	Science of Sintering	Yugoslavia	0.000	1	0	1	0.01	97.89
527	Solid Mechanics Archives	UK	0.000	1	0	1	0.01	97.90
528	Soviet Journal of Nuclear Physics	USA	0.712	1	0	1	0.01	97.91
529	Spectrochimice Acta, Part A [Molecular Spectroscopy]	UK	0.000	1	0	1	0.01	97.92
530	Strain	UK	0.000	1	0	1	0.01	97.93
531	Superconductivity Review	UK	0.000	0	1	1	0.01	97.94
532	Tecnica Italiana	Italy	0.000	0	1	1	0.01	97.95
533	Telecommunications	India	0.000	0	1	1	0.01	97.96
534	Telematics India	India	0.000	1	0	1	0.01	97.97
535	Thin-Walled Structures	UK	0.258	1	0	1	0.01	97.98
536	Transactions of the ASME. Journal of Energy Resources Technology	USA	0.138	1	0	1	0.01	97.99
537	Transactions of the ASME. Journal of Fluids Engineering	USA	0.383	0	1	1	0.01	98.00
538	Transactions of the Japan Society for Aeronautical and Space Sciences	Japan	0.000	0	1	1	0.01	98.01
539	Transport Theory and Statistical	USA	0.000	0	1	1	0.01	98.02

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	Physics							
540	Tribology International	UK	0.239	1	0	1	0.01	98.03
541	Vision Research	UK	2.221	1	0	1	0.01	98.04
542	Water Resources Research	USA	1.574	1	0	1	0.01	98.05
543	Wave Motion	Netherlands	0.586	0	1	1	0.01	98.06
544	Journal of Microcomputer Applications	UK	0.123	1	0	1	0.01	98.07
545	Journal of Microwave Power and Electromagnetic Energy	USA	0.145	1	0	1	0.01	98.08
546	Journal of Non-Newtonian Fluid Mechanics	Netherlands	1.535	0	1	1	0.01	98.09
547	Journal of Rheology	USA	2.315	0	1	1	0.01	98.10
548	Journal of Strain Analysis for Engineering Design	UK	0.413	1	0	1	0.01	98.11
549	Journal of Thermal Biology	UK	1.124	1	0	1	0.01	98.12
550	*Journal of Thermal Stresses*	USA	0.500	0	1	1	0.01	98.13
551	Journal of Thermophysics and Heat Transfer	USA	0.832	1	0	1	0.01	98.14
552	Journal of the Astronautical Sciences	USA	0.230	1	0	1	0.01	98.15
553	Journal of the Chinese Institute of Engineers	Taiwan	0.000	1	0	1	0.01	98.16
554	Journal of the Mechanics and Physics of Solids	UK	2.012	0	1	1	0.01	98.17
555	Laser and Particle Beams	UK	0.389	1	0	1	0.01	98.18
556	MAGMA	UK	0.000	0	1	1	0.01	98.19
557	Materials Science Forum	Switzerland	0.291	0	1	1	0.01	98.20
558	Materials at High Temperatures	UK	0.207	0	1	1	0.01	98.21
559	Mathematical Proceedings of the Cambridge Philosophical Society	UK	0.417	0	1	1	0.01	98.22
560	Meccanica	Netherlands	0.000	0	1	1	0.01	98.23
561	Mechanics of Structures and Machines	USA	0.333	0	1	1	0.01	98.24

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562	Medical Engineering & Physics	UK	0.000	0	1	1	0.01	98.25
563	Metallurgical Transactions B [Process Metallurgy]	USA	1.059	1	0	1	0.01	98.26
564	Meteoritics	USA	4.067	0	1	1	0.01	98.27
565	Meteorological Magazine	UK	0.205	1	0	1	0.01	98.28
566	International Journal of Applied Engineering Education	UK	0.000	1	0	1	0.01	98.29
567	International Journal of Engineering Education	Germany	0.014	0	1	1	0.01	98.30
568	International Journal of Hyperthermia	UK	0.938	1	0	1	0.01	98.31
569	International Journal of Materials & Product Technology	Switzerland	0.000	0	1	1	0.01	98.32
570	International Journal of Modern Physics D	Singapore	0.000	0	1	1	0.01	98.33
571	International Journal of Numerical Methods for Heat & Fluid Flow	UK	0.359	0	1	1	0.01	98.34
572	International Journal of Plasticity	UK	0.862	0	1	1	0.01	98.35
573	International Journal of Polymeric Materials	UK	0.160	1	0	1	0.01	98.36
574	International Journal of Refractory & Hard Metals	UK	0.000	1	0	1	0.01	98.37
575	International Journal of Science Education	UK	0.000	1	0	1	0.01	98.38
576	International Journal of Systems Science	UK	0.146	1	0	1	0.01	98.39
577	Inverse Problems	UK	0.980	0	1	1	0.01	98.40
578	JNMM	USA	0.219	1	0	1	0.01	98.41
579	JSME International Journal, Series A [Mechanics and Material Engineering]	Japan	1.096	0	1	1	0.01	98.42
580	Journal de Physique II [Atomic, Molecular and Cluster Physics, Chemical Physics, Mechanics and Hydro	France	0.000	0	1	1	0.01	98.43

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581	Journal of Adhesion	UK	0.636	1	0	1	0.01	98.44
582	Journal of Adhesion Science and Technology	Netherlands	0.971	0	1	1	0.01	98.45
583	Journal of Applied Meteorology	USA	1.187	0	1	1	0.01	98.46
584	Journal of Applied Phywics	USA	0.000	1	0	1	0.01	98.47
585	Journal of Atmospheric and Oceanic Technology	USA	0.843	0	1	1	0.01	98.48
586	Journal of Biochemical and Biophysical Methods	Netherlands	1.106	1	0	1	0.01	98.49
587	Journal of Composites Technology and Research	USA	0.472	0	1	1	0.01	98.50
588	Journal of Crystallographic and Spectroscopic Research	USA	0.406	1	0	1	0.01	98.51
589	Journal of Electroanalytical Chemistry and Interfacial Electrochemistry	Switzerland	2.020	1	0	1	0.01	98.52
590	Journal of Electronic Materials	USA	1.238	0	1	1	0.01	98.53
591	Journal of Electrostatics	Netherlands	0.185	0	1	1	0.01	98.54
592	Journal of Fluid Mechanics	UK	1.864	1	0	1	0.01	98.55
593	Journal of Functional Analysis	USA	0.647	1	0	1	0.01	98.56
594	Journal of Geodynamics	UK	0.081	0	1	1	0.01	98.57
595	Journal of Geology	USA	1.873	1	0	1	0.01	98.58
596	Journal of Magnetic Resonance, Series B	USA	2.625	0	1	1	0.01	98.59
597	Journal of Mathematical Biology	Germany	0.614	0	1	1	0.01	98.60
598	Computers and Biomedical Research	USA	1.051	0	1	1	0.01	98.61
599	Computers in Biology and Medicine	UK	0.705	0	1	1	0.01	98.62
600	*Contributions to Atmospheric* Physics	Germany	0.000	0	1	1	0.01	98.63
601	Czechoslovak Journal of Physics, Section B	Czech Republ	0.000	1	0	1	0.01	98.64
602	Deep-Sea Research, Part II [Topical Studies in Oceanography]	UK	1.029	0	1	1	0.01	98.65

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990 1994	Total	% Share	% Cum. Total
603	Desalination	Netherlands	0.318	1	0 1	0.01	98.66
604	*Dynamics of Atmospheres and Oceans*	*Netherlands*	*0.782*	1	*0* 1	*0.01*	*98.67*
605	EOS Transactions of the American Geophysical Union	USA	0.000	1	0 1	0.01	98.68
606	Electro- and Magnetobiology	USA	0.962	0	1 1	0.01	98.69
607	Electro-Technology	India	0.000	1	0 1	0.01	98.70
608	*Electron Technology*	*Poland*	*0.000*	0	1 1	*0.01*	*98.71*
609	Engineering Analysis	UK	0.000	1	0 1	0.01	98.72
610	Engineering Analysis with Boundary Elements	UK	0.335	0	1 1	0.01	98.73
611	European Journal of Nuclear Medicine	Germany	2.690	1	0 1	0.01	98.74
612	European Polymer Journal	UK	0.719	1	0 1	0.01	98.75
613	Few-Body Systems	Austria	1.377	1	0 1	0.01	98.76
614	Fiber and Integrated Optics	USA	0.232	0	1 1	0.01	98.77
615	Finite Elements in Analysis and Design	Netherlands	0.000	0	1 1	0.01	98.78
616	Foundations of Physics Letters	USA	0.306	1	0 1	0.01	98.79
617	Geoexploration	Netherlands	0.000	1	0 1	0.01	98.80
618	Geological Journal	UK	0.400	1	0 1	0.01	98.81
619	Geology	USA	2.053	1	0 1	0.01	98.82
620	High Temperature	USA	0.173	0	1 1	0.01	98.83
621	IEE Proceedings A [Physical Science, Measurement and Instrumentation, Management and Education]	UK	0.403	1	0 1	0.01	98.84
622	IEE Proceedings J [Optoelectronics]	UK	0.727	1	0 1	0.01	98.85
623	IEEE Electron Device Letters	USA	0.000	0	1 1	0.01	98.86
624	IEEE Photonics Technology Letters	USA	1.244	0	1 1	0.01	98.87
625	IEEE Potentials	USA	0.000	0	1 1	0.01	98.88
626	IEEE Spectrum	USA	*0.623*	*0*	1 1	*0.01*	*98.89*
627	IEEE Transactions on Antennas and Propagation	USA	0.806	0	1 1	0.01	98.90
628	IEEE Transactions on Biomedical	USA	1.061	0	1 1	0.01	98.91

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	# of Papers 1994	# of Papers Total	% Share	% Cum. Total
	Engineering							
629	IEEE Transactions on Dielectrics and Electrical Insulation	USA	0.000	0	1	1	0.01	98.92
630	IEEE Transactions on Magnetics	USA	0.758	0	1	1	0.01	98.93
631	IEEE Transactions on Microwave Theory and Techniques	USA	1.004	0	1	1	0.01	98.94
632	IEEE Transactions on Ultrasonics, Ferroelectrics and Frequency Control	USA	0.927	0	1	1	0.01	98.95
633	ISPRS Journal of Photogrammetry and Remote Sensing	Netherlands	0.000	1	0	1	0.01	98.96
634	ITC Journal	Netherlands	0.000	1	0	1	0.01	98.97
635	Information Bulletin on Variable Stars	Hungary	0.000	1	0	1	0.01	98.98
636	AIChE Journal	USA	1.359	0	1	1	0.01	98.99
637	Acta Astronomica	Poland	0.000	1	0	1	0.01	99.00
638	Acta Geodaetica, Geophysica et Montanistica Hungarica	Hungary	0.000	0	1	1	0.01	99.01
639	Acta Metallurgica	USA	0.000	1	0	1	0.01	99.02
640	Active and Passive Electronic Components	UK	0.000	0	1	1	0.01	99.03
641	Annales de la Fondation Louis de Broglie	France	0.000	0	1	1	0.01	99.04
642	Apeiron	Canada	0.000	1	0	1	0.01	99.05
643	Applicable Analysis	UK	0.000	0	1	1	0.01	99.06
644	Applied Mathematical Modelling	UK	0.271	1	0	1	0.01	99.07
645	Applied Mathematics and Computation	USA	0.241	0	1	1	0.01	99.08
646	Applied Physics B [Lasers and Optics]	Germany	0.000	0	1	1	0.01	99.09
647	Applied Rediation and Isotopes	UK	0.000	1	0	1	0.01	99.10
648	Applied Spectroscopy	USA	1.408	0	1	1	0.01	99.11
649	Applied Spectroscopy Reviews	USA	1.278	0	1	1	0.01	99.12
650	Applied Superconductivity	UK	0.929	0	1	1	0.01	99.13

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	1994	Total	% Share	% Cum. Total
651	Archives of Mechanics	Poland	0.000	0	1	1	0.01	99.14
652	Astronomical Journal	USA	2.754	1	0	1	0.01	99.15
653	Astronomy and Astrophysics Review	Germany	5.133	1	0	1	0.01	99.16
654	Asymptotic Analysis	Netherlands	0.000	0	1	1	0.01	99.17
655	Atmospheric Research	Netherlands	0.000	0	1	1	0.01	99.18
656	Australian Meteorological Magazine	Australia	0.273	1	0	1	0.01	99.19
657	BHEL Journal	India	0.000	0	1	1	0.01	99.20
658	Biophysics	UK	4.247	1	0	1	0.01	99.21
659	Biorheology	UK	0.826	0	1	1	0.01	99.22
660	Biosensors & Bioelectronics	UK	1.858	0	1	1	0.01	99.23
661	Bulletin of the Seismological Society of America	USA	0.000	1	0	1	0.01	99.24
662	CALPHAD: Computer Coupling of Phase Diagrams and Thermochemistry	UK	0.000	0	1	1	0.01	99.25
663	CSI Communications	India	0.000	0	1	1	0.01	99.26
664	Canadian Journal of Chemistry	Canada	1.127	0	1	1	0.01	99.27
665	Canadian Journal of Spectroscopy	Canada	0.000	1	0	1	0.01	99.28
666	Canadian Metallurgical Quarterly	Canada	0.354	1	0	1	0.01	99.29
667	Carbon	UK	1.619	1	0	1	0.01	99.30
668	Chemical Engineering Progress	USA	0.467	1	0	1	0.01	99.31
669	Chemical Engineering Research & Design	UK	0.488	0	1	1	0.01	99.32
670	Chemical Engineering and Processing	Switzerland	0.500	1	0	1	0.01	99.33
671	Colloid & Polymer Science	Germany	1.020	0	1	1	0.01	99.34
672	Comments on Astrophysics. Comments on Modern Physics: Part C	UK	0.000	1	0	1	0.01	99.35
673	Communications in Applied Numerical Methods	UK	0.476	1	0	1	0.01	99.36
674	Communications in Numerical Methods in Engineering	UK	0.367	0	1	1	0.01	99.37
675	Communications in Theoretical Physics	China	0.261	0	1	1	0.01	99.38

Rank #	Journal	Country	Impact Factor SCI 1994	# of Papers 1990	1994	Total	% Share	% Cum. Total
676	Composites	UK	0.821	0	1	1	0.01	99.39
677	Comptes Rendus de l'Academie des Sciences, Serie I [Mathematique]	France	0.000	0	1	1	0.01	99.40
678	Computerized Medical Imaging and Graphics	UK	0.536	0	1	1	0.01	99.41
	Non-journal items			293	141	434	99.41	
	Total			4552	4211	8763	99.41	

Appendix-14

INDIAN JOURNALS USED FOR REOPORTING INDIAN CONTRIBUTIONS IN PHYSICS

As seen from INSPEC-Physics, 1990 and 1994

Impact Sr #	Rank #	Journal Title	Factor (SCI 1994)	# of Papers 1990	1994	Total	% Share
1	1	Indian Journal of Pure and Applied Physics	0.229	203	195	398	4.78
2	2	Pramana	0.345	124	100	224	2.69
3	5	Indian Journal of Physics, Part B	0.000	65	79	144	1.73
4	10	Indian Journal of Radio & Space Physics	0.075	66	50	116	1.39
5	12	Indian Journal of Physics, Part A	0.000	62	47	109	1.31
6	14	Proceedings of the Indian National Science Academy, Part A	0.000	51	45	96	1.15
7	20	Mausam	0.000	49	28	77	0.92
8	21	Journal of the Acoustical Society of India	0.000	73	0	73	0.88
9	31	Indian Journal of Theoretical Physics	0.000	35	18	53	0.64
10	40	Current Science	0.271	23	25	48	0.58
11	42	Indian Journal of Pure and Applied Mathematics	0.049	24	23	47	0.56
12	52	Journal of Astrophysics and Astronomy	0.706	28	11	39	0.47
13	55	Indian Journal of Marine Sciences	0.129	25	12	37	0.44
14	60	Proceedings of the Indian Academy of Sciences, Earth and Planetary Sciences	0.000	20	14	34	0.41
15	63	Acta Ciencia Indica, Mathematics	0.000	12	20	32	0.38
16	73	Bulletin of Materials Science	0.000	21	8	29	0.35
17	74	Bulletin of the Astronomical Society of India	0.000	0	28	28	0.34
18	79	IETE Technical Review	0.000	10	17	27	0.32
19	81	Journal of Optics	0.000	10	16	26	0.31
20	102	Journal of Association of Exploration Geophysicists	0.000	19	1	20	0.24
21	105	Journal of Pure and Applied Ultrasonics	0.000	19	0	19	0.23
22	109	Physics Education	0.000	19	0	19	0.23
23	111	Indian Journal of Technology	0.128	16	3	19	0.23
24	118	Journal of Mathematical and Physical Sciences	0.000	5	13	18	0.22

Sr #	Rank #	Journal Title	Impact Factor (SCI 1994)	# of Papers 1990	1994	Total	% Share
25	123	Acta Ciencia Indica, Physics	0.000	17	0	17	0.20
26	126	Defence Science Journal	0.000	11	5	16	0.19
27	165	Transactions of the Indian Institute of Metals	0.000	2	9	11	0.13
28	186	Sadhana	0.041	5	5	10	0.12
29	211	Journal of the Institution of Electronics and Telecommunication Engineers	0.000	4	4	8	0.10
30	232	Journal of the Assam Science Society	0.000	0	7	7	0.08
31	241	Indian Journal of Power and River Valley Development	0.000	4	3	7	0.08
32	253	Indian Journal of Chemical Technology	0.000	0	6	6	0.07
33	270	Proceedings of the Indian Academy of Sciences, Chemical Sciences	0.000	4	2	6	0.07
34	273	National Academy Science Letters	0.054	4	1	5	0.06
35	281	Students' Journal of the Institution of Electronics & Telecommunication Engineers	0.000	1	4	5	0.06
36	290	Journal of the Institution of Engineers [India] Electronics and Telecommunication Engineering Divisi	0.000	1	4	5	0.06
37	320	Indian Journal of Engineering and Materials Sciences	0.000	0	4	4	0.05
38	331	Journal of the Electrochemical Society of India	0.000	1	3	4	0.05
39	332	Journal of the Institution of Engineers [India], Metallurgy & Material Science Division	0.000	4	0	4	0.05
40	345	Ultra Scientist of Physical Sciences	0.000	0	4	4	0.05
41	361	Proceedings of the Indian Academy of Sciences, Mathematical Sciences	0.000	1	2	3	0.04
42	370	Journal of the Institution of Engineers [India], Interdisciplinary Panels	0.000	3	0	3	0.04
43	420	Electrical India	0.000	2	0	2	0.02
44	455	Journal of the Indian Institute of Science	0.000	2	0	2	0.02
45	456	Journal of the Institution of Engineers [India] Electrical Engineering Division	0.000	1	1	2	0.02
46	492	Opsearch	0.000	1	0	1	0.01
47	533	Telecommunications	0.000	0	1	1	0.01

Sr #	Rank #	Journal Title	Impact Factor (SCI 1994)	# of Papers 1990	1994	Total	% Share
48	534	Telematics India	0.000	1	0	1	0.01
49	607	Electro-Technology	0.000	1	0	1	0.01
50	657	BHEL Journal	0.000	0	1	1	0.01
51	663	CSI Communications	0.000	0	1	1	0.01

Appendix-15

CONTRIBUTION OF INDIAN INSTITUTIONS TO PHYSICS RESEARCH

As seen from INSPEC-Physics, 1990 and 1994

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
1	Bhabha Atomic Research Centre, Bombay	272	230	502	5.73	5.73
2	Indian Inst. of Sci., Bangalore	228	240	468	5.34	11.07
3	Tata Inst. of Fundamental Res., Bombay	184	180	364	4.15	15.22
4	Indian Inst. of Technol., New Delhi	161	160	321	3.66	18.89
5	Indian Inst. of Technol., Madras	129	143	272	3.10	21.99
6	Banaras Hindu Univ., Varanasi	153	107	260	2.97	24.96
7	Nat. Phys. Lab., New Delhi	120	106	226	2.58	27.54
8	Jadavpur Univ., Calcutta	114	111	225	2.57	30.10
9	Indian Inst. of Technol., Kharagpur, West Bengal	108	114	222	2.53	32.64
10	Ind. Assoc. for the Cultivation of Sci., Calcutta	101	110	211	2.41	35.05
11	Indian Inst. of Technol., Kanpur	96	92	188	2.15	37.19
12	Indian Institute of Technology, Bombay	92	93	185	2.11	39.30
13	Delhi Univ., Delhi	86	71	157	1.79	41.09
14	Saha Inst. of Nucl. Phys., Calcutta	77	59	136	1.55	42.65
15	Indira Gandhi Centre for Atomic Res., Kalpakkam	68	66	134	1.53	44.17
16	Hyderabad Univ.	48	84	132	1.51	45.68
17	Calcutta Univ., Calcutta	51	57	108	1.23	46.91
18	Inst. of Phys., Bhubaneswar	28	69	97	1.11	48.02
19	Rajasthan Univ., Jaipur	63	31	94	1.07	49.09
20	Indian Inst. of Astrophys., Bangalore	49	44	93	1.06	50.15
21	Poona Univ., Pune	60	32	92	1.05	51.20
22	Osmania Univ., Hyderabad	41	48	89	1.02	52.22
23	Phys. Res. Lab., Ahmedabad	47	38	85	0.97	53.19
24	Andhra Univ., Visakhpatnam	51	31	82	0.94	54.13
25	Defence Metall. Res. Lab., Hyderabad	46	32	78	0.89	55.02

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
26	Sri Venkateswara Univ., Tirupati	50	27	77	0.88	55.89
27	Anna Univ., Madras	28	47	75	0.86	56.75
28	Roorkee Univ., Roorkee	37	35	72	0.82	57.57
29	Punjab Univ., Chandigarh	35	34	69	0.79	58.36
30	Aligarh Muslim Univ., Aligarh	32	33	65	0.74	59.10
31	Cochin Univ. of Sci. & Technol., Cochin	40	25	65	0.74	59.84
32	Indian Stat. Inst., Calcutta	34	26	60	0.68	60.53
33	Shivaji Univ., Kolhapur	22	38	60	0.68	61.21
34	India Meteorol. Office, New Delhi	33	26	59	0.67	61.89
35	Nat. Inst. of Oceanogr., Dona Paula, Goa	31	19	50	0.57	62.46
36	Vikram Sarabhai Space Centre, Trivandrum	21	29	50	0.57	63.03
37	Nat. Chem. Lab., Pune	25	24	49	0.56	63.59
38	Inst. for Plasma Res., Gandhinagar	23	25	48	0.55	64.13
39	Indian Inst. of Tropical Meteorol., Pune	12	32	44	0.50	64.64
40	Nagarjuna Univ.	33	11	44	0.50	65.14
41	Kalyani Univ., West Bengal	21	23	44	0.50	65.64
42	Guru Nanak Dev Univ., Amritsar	25	18	43	0.49	66.13
43	Raman Res. Inst., Bangalore	30	13	43	0.49	66.62
44	Center for Adv. Technol., Indore	8	35	43	0.49	67.11
45	Inst. of Math. Sci., Madras	21	21	42	0.48	67.59
46	Central Electrochem. Res. Inst., Karaikudi	17	24	41	0.47	68.06
47	Nat. Aeronaut. Lab., Bangalore	17	24	41	0.47	68.53
48	Regional Res. Lab., CSIR, Trivandrum	18	23	41	0.47	68.99
49	Jawaharlal Nehru Univ., New Delhi	12	29	41	0.47	69.46
50	Madras Univ., Guindy Campus	21	20	41	0.47	69.93
51	Maharshi Dayanand Univ., Rohtak	26	15	41	0.47	70.40
52	North-Eastern Hill Univ., Shillong	23	16	39	0.45	70.84
53	Sardar Patel Univ., Vallabh Vidyanagar	22	17	39	0.45	71.29
54	Burdwan Univ., Burdwan	16	22	38	0.43	71.72
55	Allahabad Univ.	20	17	37	0.42	72.14
56	Bombay Univ., Bomaby	21	16	37	0.42	72.57
57	Himachal Pradesh Univ., Shimla	17	18	35	0.40	72.97

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
58	North Bengal Univ., Darjeeling	14	20	34	0.39	73.35
59	Central Glass & Ceramic Res. Inst., Calcutta	15	19	34	0.39	73.74
60	Solid State Phys. Lab., Delhi	18	15	33	0.38	74.12
61	Madurai Kamaraj Univ., Madurai	16	17	33	0.38	74.50
62	Gorakhpur Univ., Gorakhpur	24	9	33	0.38	74.87
63	Mysore Univ., Musore	14	18	32	0.37	75.24
64	Nat. Geophys., Res. Inst., Hyderabad	20	12	32	0.37	75.60
65	Karnatak Univ., Dharwad	19	12	31	0.35	75.96
66	Bharat Heavy Electr. Ltd., Hyderabad	12	19	31	0.35	76.31
67	Visva-Bharati Univ., West Bengal	19	11	30	0.34	76.65
68	Devi Ahily Univ., Indore	11	18	29	0.33	76.98
69	Variable Energy Cyclotron Centre, Calcutta	10	19	29	0.33	77.31
70	ISRO SHAR Centre, Sriharikota	14	14	28	0.32	77.63
71	Kakatiya Univ., Warangal	16	12	28	0.32	77.95
72	Agra Univ., Agra	15	12	27	0.31	78.26
73	Gauhati Univ., Guwahati	14	13	27	0.31	78.57
74	Kurukshetra Univ.	14	13	27	0.31	78.88
75	Punjabi Univ., Patiala	17	10	27	0.31	79.19
76	Lucknow Univ., Lucknow	12	13	25	0.29	79.47
77	Manipur Univ., Imphal	22	3	25	0.29	79.76
78	Barkatullah Univ., Bhopal	10	15	25	0.29	80.04
79	Indian Inst. of Geomagnetism, Bombay	17	8	25	0.29	80.33
80	Inter-Univ. Centre for Astron. & Astrophys., Pune	1	23	24	0.27	80.60
81	Indian Sch. of Mines, Dhanbad	14	9	23	0.26	80.86
82	Kerala Univ., Trivandrum	12	11	23	0.26	81.13
83	Pondicherry Univ.	14	9	23	0.26	81.39
84	Uttar Pradesh State Obs., Naini Tal	11	12	23	0.26	81.65
85	Sri Krishnadevaraya Univ., Anantapur	18	4	22	0.25	81.90
86	Space Applications Centre, Ahmedabad	7	14	21	0.24	82.14
87	Kumaun Univ., Nainital	14	6	20	0.23	82.37

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
88	Saurashtra Univ., Rajkot	10	10	20	0.23	82.60
89	M.S. Baroda Univ.	7	12	19	0.22	82.81
90	S N Bose Nat. Centre for Basic Sci., Calcutta	4	15	19	0.22	83.03
91	Regional Res. Lab., Bhopal	12	6	18	0.21	83.24
92	Naval Phys. & Oceanogr. Lab., Cochin	12	6	18	0.21	83.44
93	Vikram Univ., Ujjain	8	10	18	0.21	83.65
94	Bharathiar Univ., Coimbatore	2	16	18	0.21	83.85
95	Jodhpur Univ., Jodhpur	12	6	18	0.21	84.06
96	Indian Inst. of Chem. Technol., Hyderabad	9	8	17	0.19	84.25
97	Nat. Metall. Lab., Jamshedpur	9	8	17	0.19	84.45
98	Bose Inst., Calcutta	4	12	16	0.18	84.63
99	Ravishankar Univ., Raipur	13	3	16	0.18	84.81
100	Utkal Univ., Bhubaneswar	5	11	16	0.18	84.99
101	Bharathidasan Univ., Tamilnadu	3	11	14	0.16	85.15
102	Berhampur Univ., Orissa	9	4	13	0.15	85.30
103	Marathwada Univ., Aurangabad	5	8	13	0.15	85.45
104	Rani Durgavati Vishwavidyalaya, Jabalpur	5	8	13	0.15	85.60
105	Central Electron. Eng. Res. Inst., Pilani	10	3	13	0.15	85.75
106	Steel Authority of India Ltd., Ranchi	9	2	11	0.13	85.87
107	Inst. of Adv. Study in Sci. & Technol., Guwahati	8	3	11	0.13	86.00
108	Mahatma Gandhi Univ., Kerala	2	9	11	0.13	86.12
109	Orissa Univ. of Agric. & Technol., Bhubaneswar	10	1	11	0.13	86.25
110	Jammu Univ., Jammu	0	11	11	0.13	86.37
111	Dibrugarh Univ.	0	10	10	0.11	86.49
112	Gujarat Univ., Ahmedabad	5	5	10	0.11	86.60
113	Garhwal Univ.,	7	3	10	0.11	86.72
114	Mangalore Univ.	6	4	10	0.11	86.83
115	Instrum. Res. & Dev. Establ., Dehradun	7	3	10	0.11	86.95

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
116	Oil & Natural Gas Comm., Dehradun	7	2	9	0.10	87.05
117	Calicut Univ., Kerala	5	4	9	0.10	87.15
118	Jamia Millia Islamia, New Delhi	3	6	9	0.10	87.25
119	Alagappa Univ., Karaikudi	2	6	8	0.09	87.34
120	Bangalore Univ.	4	4	8	0.09	87.44
121	Meerut Univ., Meerut	4	4	8	0.09	87.53
122	Sambalpur Univ., Orissa	6	2	8	0.09	87.62
123	Defence Electron. Applications Lab., Dehradun	4	4	8	0.09	87.71
124	Inst. of Theor. Phys., Calcutta	7	0	7	0.08	87.79
125	All India Inst. of Med. Sci., New Delhi	6	1	7	0.08	87.87
126	Bhagalpur Univ., Bhagalpur	6	1	7	0.08	87.95
127	Bhavnagar Univ.	3	4	7	0.08	88.03
128	Bihar Univ., Muzaffarpur	4	2	6	0.07	88.10
129	Haryana Agric. Univ., Hisar	1	5	6	0.07	88.17
130	Jiwaji Univ., Gwalior	1	5	6	0.07	88.23
131	Punjab Agric. Univ., Ludhiana	3	3	6	0.07	88.30
132	Geol. Survey of India, Calcutta	5	1	6	0.07	88.37
133	Nucl. Power Corp. of India Ltd., Bombay		3	3	6	0.07
134	Tata Res. Dev. & Design Centre, Pune		6	0	6	0.07
135	Nat. Remote Sensing Agency, Hyderabad		2	4	6	0.07
136	Navel Chem. & Metall. Lab., Naval Dockyard, Bombay	3	3	6	0.07	88.65
137	Central Arid Zone Res. Inst., Jodhpur		3	2	5	0.06
138	Regional Res. Lab., Orissa	2	3	5	0.06	88.76
139	Magadh Univ., Bodh Gaya	4	1	5	0.06	88.82
140	Central Power Res. Inst., Bangalore		4	1	5	0.06
141	Pantnagar Univ.	3	2	5	0.06	88.93
142	Gulbarga Univ., Gulbarga	3	1	4	0.05	88.98
143	Dr Harisingh Gour Vishwavidyalaya, Sagar	2	2	4	0.05	89.02
144	Sri Sathya Sai Inst. of Higher Learning, Prasanthinilayam	3	1	4	0.05	89.07
145	Geological Survey of India, Calcutta		2	2	4	0.05

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total	
146	Central Salt & Marine Chem. Res. Inst., Bhavnagar		2	2	4	0.05	8
147	Jawaharlal Nehru Centre for Adv. Sci. Res., Bangalore		0	4	4	0.05	8
148	Udaipur Solar Obs.	1	3	4	0.05	89.25	
149	Inter Univ. Consortium for Dept. of At. Energy Facil., Calcutta		0	4	4	0.05	8
150	Defence Res. and Dev. Lab., Hyderabad		0	4	4	0.05	8
151	Defence Sci. Centre, Delhi	4	0	4	0.05	89.39	
152	Indian Petrochem. Corp. Ltd., Vadodara		1	2	3	0.03	8
153	Hindustan Lever Res. Centre, Bombay		0	3	3	0.03	8
154	Mehta Res. Inst., Allahabad	0	3	3	0.03	89.49	
155	Central Electron. Ltd., Sahibabad	3	0	3	0.03	89.52	
156	Central Sci. Instrum. Organ., Chandigarh	3	0	3	0.03	89.56	
157	Indian Inst. of Pet., Dehra Dun	2	1	3	0.03	89.59	
158	Structural Eng. Res. Centre, Madras		1	2	3	0.03	8
159	Dept. of Sci. & Technol., New Delhi		1	2	3	0.03	8
160	Ranchi Univ., Ranchi	2	1	3	0.03	89.70	
161	Tripura Univ., Tripura	1	2	3	0.03	89.73	
162	Bharat Electron. Ltd., Bangalore	3	0	3	0.03	89.76	
163	Nat. Inst. of Mental Health & Neuro Sci., Bangalore		1	2	3	0.03	8
164	Annamalai Univ.	2	1	3	0.03	89.83	
165	Goa Univ., Bambolim	3	0	3	0.03	89.87	
166	Postgraduate Inst. of Med. Educ. & Res., Chandigarh	1	1	2	0.02	89.89	
167	Sukhadia Univ., Udaipur	1	1	2	0.02	89.91	
168	Vidyasagar Univ., West Bengal	2	0	2	0.02	89.93	
169	Workshop Dept., Nat. Council of Educ. Res. & Training, New Delhi, India	2	0	2	0.02	89.96	
170	Minist. of Non-Conventional Energy Sources, Madras	0	2	2	0.02	89.98	
171	Hindustan Aeronaut. Ltd., Bangalore	2	0	2	0.02	90.00	

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
172	Soc. for Appl. Microwave Electron. Eng. & Res., Bombay	0	2	2	0.02	90.03
173	Central Leather Res. Inst., Tamil Nadu	1	1	2	0.02	90.05
174	Central Min. Res. Station, Dhanbad	2	0	2	0.02	90.07
175	Nat. Inst. of Sci. Technol. & Dev. Studies, New Delhi	1	1	2	0.02	90.09
176	Wadia Inst. of Himalayan Geol., Dehradun	0	2	2	0.02	90.12
177	Nat. Aluminium Co. Ltd., Orissa	2	0	2	0.02	90.14
178	Alchemie Res. Centre, Thane	2	0	2	0.02	90.16
179	Thapar Corp. Res. & Dev. Centre, Patiala	1	1	2	0.02	90.19
180	Aeronaut. Dev. Agency, Bangalore	1	1	2	0.02	90.21
181	ANURAG, Hyderabad	1	1	2	0.02	90.23
182	Centre for Artificial Intelligence & Robotics, Bangalore	0	2	2	0.02	90.25
183	Defence Lab., Jodhpur	1	1	2	0.02	90.28
184	Defense Mater. & Stores Res. & Dev. Establ., Kanpur	2	0	2	0.02	90.30
185	Inst. of Armament Technol., Pune	0	2	2	0.02	90.32
186	Defence Mater. & Stores Res. & Dev. Establ., Kanpur	2	0	2	0.02	90.35
187	Nat. Defence Acad., Pune	2	0	2	0.02	90.37
188	Indian Oil Co., Faridabad	0	1	1	0.01	90.38
189	Indian Telephone Ind., Bangalore	1	0	1	0.01	90.39
190	Bharat Gold Mines Ltd., Karnataka	1	0	1	0.01	90.40
191	Birla Inst. of Sci. Res., Jaipur	1	0	1	0.01	90.41
192	Fort Gloster Ind. Ltd., West Bengal	1	0	1	0.01	90.43
193	Battery Society of India, Indian Lead Zinc Inf. Centre, New Delhi	1	0	1	0.01	90.44
194	Larsen & Toubro Ltd., Bombay	0	1	1	0.01	90.45
195	Metall. & Eng. Consultants (India) Ltd., Ranchi	0	1	1	0.01	90.46
196	NPCIL, Bombay	0	1	1	0.01	90.47
197	Pollution Equipments & Controls, Delhi	1	0	1	0.01	90.48

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
198	Tata Energy Res. Inst., New Delhi	1	0	1	0.01	90.49
199	Tata Iron & Steel Co., Jamshedpur	0	1	1	0.01	90.51
200	Tirupati Tantra Niketan, Akola, Maharastra	1	0	1	0.01	90.52
201	Atomic Energy Comm.	0	1	1	0.01	90.53
202	Dept. of Atomic Energy, Hyderabad	1	0	1	0.01	90.54
203	Nuclear Fuel Complex, Hyderabad	0	1	1	0.01	90.55
204	Tarapur Atomic Power Station, Maharashtra	1	0	1	0.01	90.56
205	Tata Memorial Hospital, Bombay	0	1	1	0.01	90.57
206	Inst. of Plasma Res., Gandhinagar	1	0	1	0.01	90.59
207	Remote Sensing Applications Centre, Uttar Pradesh	1	0	1	0.01	90.60
208	Aeronaut. Dev. Establ., CV Raman Nagar Bangalore	1	0	1	0.01	90.61
209	Armament Res. & Dev. Establ., Pune	1	0	1	0.01	90.62
210	Coll. of Mil. Eng., Poona	1	0	1	0.01	90.63
211	Defence Electron. Res. Lab., Hyderabad	0	1	1	0.01	90.64
212	Terminal Ballistics Res. Lab., Chandigarh	1	0	1	0.01	90.65 $
213	Central Soil & Water Conservation Res. & Training Inst., Karnataka	0	1	1	0.01	90.67
214	Central Soil & Water Conservation Res. & Training Inst., Bellary	1	0	1	0.01	90.68
215	Indian Agric. Res. Inst., New Delhi	1	0	1	0.01	90.69
216	ICAR Res. Complex, Shillong	1	0	1	0.01	90.70
217	Nat. Dairy Res. Inst., Karnal	1	0	1	0.01	90.71
218	Centre for Dev. of Adv. Comput., Pune Univ.	0	1	1	0.01	90.72
219	Central Building Res. Inst., Roorkee	1	0	1	0.01	90.73
220	Central Drug Res. Inst., Lucknow	1	0	1	0.01	90.75
221	CSIR, Madras	1	0	1	0.01	90.76
222	Indian Inst. of Chem. Biol., Calcutta	1	0	1	0.01	90.77

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
223	Inst. of Microbial Technol., Chandigarh	0	1	1	0.01	90.78
224	Regional Res. Lab., (CSIR), Trivandrum	0	1	1	0.01	90.79
225	Reg. Res. Lab., Jorhat	0	1	1	0.01	90.80
226	Birbal Sahni Inst. of Palaeobotany, Lucknow	0	1	1	0.01	90.81
227	Centre for Liquid Crystal Res., Bangalore	0	1	1	0.01	90.83
228	Survey of India, Dehra Dun	1	0	1	0.01	90.84
229	Central Seismol. Obs., Shillong	1	0	1	0.01	90.85
230	Sardar Patel Renewable Energy Res. Inst., Gujarat	1	0	1	0.01	90.86
231	M.P. Electr. Board, Kerala	1	0	1	0.01	90.87
232	Madhya Pradesh Council of Sci. & Technol., Bhopal	1	0	1	0.01	90.88
233	Gov. of West Bengal, Jalpaiguri	0	1	1	0.01	90.89
234	Calcutta Metropolitan Dev., Authority	1	0	1	0.01	90.90
235	West Bengal State Electr. Board	1	0	1	0.01	90.92
236	L.N. Mithila Univ., Bihar	0	1	1	0.01	90.93
237	Manonmaniam Sundaranar Univ., Tirunelveli	0	1	1	0.01	90.94
238	Narendra Deva Univ. of Agric. & Technol., Faizabad	1	0	1	0.01	90.95
239	North Maharashtra Univ., Jalgaon	0	1	1	0.01	90.96
240	Rajendra Agric. Univ., Dholi	1	0	1	0.01	90.97
241	South Gujurat Univ.	1	0	1	0.01	90.98
242	S.N.D.T. Univ., Bombay	1	0	1	0.01	91.00
243	Rubber Research Inst. of India, Kerala	0	1	1	0.01	91.01
244	Indian Council of Forestry Res. & Educ., Allahabad	0	1	1	0.01	91.02
245	Cancer Inst., Madras	1	0	1	0.01	91.03
246	Central Water & Power Res. Station, Pune	0	1	1	0.01	91.04
247	CMC Ltd., Calcutta	0	1	1	0.01	91.05
248	Engineers India Ltd., New Delhi	0	1	1	0.01	91.06

Rank #	Insitution	# of Papers 1990	1994	Total	% Share	% Cum Total
249	Hindustan Photofilm Manuf. Co. Ltd., Ootacamund	1	0	1	0.01	91.08
250	Assoc. of Indian Univ., New Delhi	0	1	1	0.01	91.09
251	Avadh Univ. Faizabad, UP	1	0	1	0.01	91.10
252	Birla Inst. of Technol., Ranchi	0	1	1	0.01	91.11
253	Dayalbagh Educ. Inst., Agra	0	1	1	0.01	91.12
254	Gurukula Kangri Univ., Hardwar	0	1	1	0.01	91.13
255	Gandhigram Rural Inst.	0	1	1	0.01	91.14
256	JNKVV, Jabalpur	1	0	1	0.01	91.16
257	Jawaharlal Nehru Technol. Univ., Hyderabad	1	0	1	0.01	91.17
258	Kanpur Univ., Kanpur	1	0	1	0.01	91.18
	Colleges - Science	243	175	418	4.77	95.95
	Colleges - Engineering	69	53	122	1.39	97.34
	Colleges - General	69	41	110	1.26	98.60
	Unknown	72	51	123	1.40	100.0
Total		8763	4552	4211	100.0	

Appendix-16

DISTRIBUTION OF PHYSICS RESEARCH IN INDIA BY STATE
As seen from INSPEC-Physics 1990 and 1994

Rank #	State	# of Papers 1990	1994	Total	% Share	% Cum. Total
1	Maharashtra	773	704	1477	16.85	16.85
2	West Bengal	620	626	1246	14.22	31.07
3	Delhi	437	438	875	9.99	41.06
4	Uttar Pradesh	459	373	832	9.49	50.55
5	Karnataka	396	373	769	8.78	59.33
6	Tamilnadu	319	364	683	7.79	67.12
7	Andhra Pradesh	345	293	638	7.28	74.40
8	Gujarat	137	133	270	3.08	77.48
9	Kerala	121	109	230	2.62	80.11
10	Madhya Pradesh	75	97	172	1.96	82.07
11	Punjab	88	68	156	1.78	83.85
12	Rajasthan	91	57	148	1.69	85.54
13	Orissa	58	87	145	1.65	87.20
14	Bihar	57	31	88	1.00	88.20
15	Haryana	42	33	75	0.86	89.06
16	Assam	22	27	49	0.56	89.62
17	Goa	30	19	49	0.56	90.17
18	Meghalaya	25	16	41	0.47	90.64
19	Himachal Pradesh	17	18	35	0.40	91.04
20	Manipur	22	3	25	0.29	91.33
21	Pondicherry	14	9	23	0.26	91.59
22	Jammu & Kashmir	5	11	16	0.18	91.77
23	Tripura	2	2	4	0.05	91.82
24	Unknown*	397	320	717	8.18	100.0
	TOTAL	4552	4211	8763	100.0	

* Mostly these papers are published from colleges which we did not analyse.

Appendix-1

CITY-WISE CONTRIBUTION TO PHYSICS RESEARCH IN INDIA
As seen from INSPEC-Physics, 1990 and 1994

Rank #	City	# of Papers 1990	1994	TOTAL	% SHARE	% Cum. TOTAL
1	Bombay	604	542	1146	13.08	13.08
2	Delhi	454	422	876	10.00	23.07
3	Calcutta	432	435	867	9.89	32.97
4	Bangalore	343	336	679	7.75	40.72
5	Madras	204	258	462	5.27	45.99
6	Hyderabad	186	215	401	4.58	50.56
7	Varanasi	153	107	260	2.97	53.53
8	Pune	109	115	224	2.56	56.09
9	Kharagpur	109	114	223	2.54	58.63
10	Kanpur	101	92	193	2.20	60.84
11	Kalpakkam	69	66	135	1.54	62.38
12	Bhubaneshwar	48	84	132	1.51	63.88
13	Trivandrum	58	64	122	1.39	65.27
14	Ahmedabad	59	57	116	1.32	66.60
15	Jaipur	64	31	95	1.08	67.68
16	Cochin	53	31	84	0.96	68.64
17	Visakhapatnam	51	31	82	0.94	69.58
18	Tirupati	50	27	77	0.88	70.46
19	Chandigarh	40	36	76	0.87	71.32
20	Roorkee	38	35	73	0.83	72.16
21	Indore	19	53	72	0.82	72.98
22	Aligarh	32	33	65	0.74	73.72
23	Berhampur	10	4	14	0.16	73.88
24	Kolhapur	22	38	60	0.68	74.56
25	Panji	31	19	50	0.57	75.13
26	Gandhinagar	25	25	50	0.57	75.70
27	Bhopal	24	21	45	0.51	76.22
28	Kalyani	21	23	44	0.50	76.72
29	Nagarjunanagar	33	11	44	0.50	77.22
30	Nainital	25	18	43	0.49	77.71
31	Amritsar	25	18	43	0.49	78.20
32	Allahabad	20	21	41	0.47	78.67
33	Rohtak	26	15	41	0.47	79.14
34	Shillong	25	16	41	0.47	79.61
35	Vallabh Vidyanagar	23	17	40	0.46	80.06
36	Burdwan	16	22	38	0.43	80.50
37	Guwahati	22	16	38	0.43	80.93
38	Mysore	18	18	36	0.41	81.34
39	Shimla	17	18	35	0.40	81.74
40	Darjeeling	14	20	34	0.39	82.13
41	Dehradun	21	12	33	0.38	82.51
42	Gorakhpur	24	9	33	0.38	82.88
43	Ludhiana	20	13	33	0.38	83.26
44	Madurai	16	17	33	0.38	83.64

Rank #	City	# of Papers 1990	1994	TOTAL	% SHARE	% Cum. TOTAL
45	Dharwad	19	12	31	0.35	83.99
46	Agra	15	13	28	0.32	84.31
47	Sriharikota	14	14	28	0.32	84.63
48	Warangal	16	12	28	0.32	84.95
49	Kurukshetra	14	13	27	0.31	85.26
50	Lucknow	13	14	27	0.31	85.56
51	Karaikudi	19	6	25	0.29	85.85
52	Dhanbad	16	9	25	0.29	86.13
53	Imphal	22	3	25	0.29	86.42
54	Jodhpur	16	9	25	0.29	86.71
55	Pondicherry	14	9	23	0.26	86.97
56	Anantapur	18	4	22	0.25	87.22
57	Baroda	8	14	22	0.25	87.47
58	Rajkot	10	10	20	0.23	87.70
59	Shantiniketan	19	11	30	0.34	88.04
60	Ranchi	13	5	18	0.21	88.25
61	Ujjain	8	10	18	0.21	88.45
62	Coimbatore	2	16	18	0.21	88.66
63	Jamshedpur	9	9	18	0.21	88.86
64	Raipur	13	3	16	0.18	89.04
65	Aurangabad	6	8	14	0.16	89.20
66	Jabalpur	6	8	14	0.16	89.36
67	Tiruchirapalli	3	11	14	0.16	89.52
68	Pilani	10	3	13	0.15	89.67
69	Kottayam	2	10	12	0.14	89.81
70	Bhavnagar	5	6	11	0.13	89.93
71	Jammu	0	11	11	0.13	90.06
72	Dibrugarh	0	10	10	0.11	90.17
73	Mangalagangothri	6	4	10	0.11	90.29
74	Srinagar	7	3	10	0.11	90.40
75	Calicut	5	4	9	0.10	90.51
76	Meerut	4	4	8	0.09	90.60
77	Sambalpur	6	2	8	0.09	90.69
78	Thane	8	0	8	0.09	90.78
79	Bhagalpur	6	1	7	0.08	90.86
80	Gwalior	1	5	6	0.07	90.93
81	Hisar	1	5	6	0.07	91.00
82	Muzaffarpur	4	2	6	0.07	91.06
83	Udaipur	2	4	6	0.07	91.13
84	Pantnagar	3	2	5	0.06	91.19
85	Bodh Gaya	4	1	5	0.06	91.25
86	Gulbarga	3	1	4	0.05	91.29
87	Prasanthinilayam	3	1	4	0.05	91.34
88	Sagar	2	2	4	0.05	91.38
89	Patiala	2	1	3	0.03	91.42
90	Sahibabad	3	0	3	0.03	91.45
91	Tripura	1	2	3	0.03	91.49
92	Annamalainagar	2	1	3	0.03	91.52

Rank #	City	of Papers			% SHARE	% Cum. TOTAL
		1990	1994	TOTAL		
93	Bambolim	3	0	3	0.03	91.56
94	Bankura	2	0	2	0.02	91.58
95	Bellary	1	1	2	0.02	91.60
96	Faizabad	2	0	2	0.02	91.62
97	Vidyasagar	2	0	2	0.02	91.65
98	Karnal	1	0	1	0.01	91.66
99	Kolar	1	0	1	0.01	91.67
100	Ootacamund	1	0	1	0.01	91.68
101	Phaltan	1	0	1	0.01	91.69
102	Surat	1	0	1	0.01	91.70
103	Tirunelveli	0	1	1	0.01	91.72
104	Akola	1	0	1	0.01	91.73
105	Amravati	1	0	1	0.01	91.74
106	Darbhanga	0	1	1	0.01	91.75
107	Dholi	1	0	1	0.01	91.76
108	Gandhigram	0	1	1	0.01	91.77
109	Godavarikhani	1	0	1	0.01	91.78
110	Guntur	1	0	1	0.01	91.80
111	Hardwar	0	1	1	0.01	91.81
112	Hooghly	1	0	1	0.01	91.82
113	Jadavpur	1	0	1	0.01	91.83
114	Jalpaiguri	0	1	1	0.01	91.84
115	Jalgaon	0	1	1	0.01	91.85
116	Johrat	0	1	1	0.01	91.86
117	Unknown	393	320	713	8.14	100.0
	TOTAL	4552	4211	8763		