

C H A P T E R 6

UTILIZATION OF INDIAN JOURNALS

A study has been carried out to find out the extent to which the Physics and Astronomy community in India and researchers outside India utilized the five Indian journals, (Indian Journal of Physics, Indian Journal of Pure and Applied Physics, Indian Journal of Radio and Space Physics, Journal of Astrophysics and Astronomy and Pramana) to publish their research findings during the period 1985 to 1989 and to determine the organisations which extended support by way of publishing papers. These journals were chosen because of their nature of publication (the journal being a research periodical was the main criterion, uninterrupted publication over the years, and coverage in secondary periodicals.

Much of the research activity in India, both fundamental and applied research, is by and large confined to research institutions. Barring a few university departments and the Indian Institutes of Technology, research activity is minimal in most of the universities. Hence seven research institutions in the country where active research is going on in physics, or in

astronomy or in both were chosen and their publication pattern was analysed to find out the journal preferences of researchers in these institutions for publishing their research findings. The institutions were chosen on the basis of their visibility in the scientific world, their past record and their achievements. However, the study had to be restricted to a limited number of institutions as one obviously cannot include all the research centres of repute in a country. Thus the notable exclusions in our list are the Bhabha Atomic Research Centre, Bombay, Institute of Physics, Bhubaneswar, National Physical Laboratory, New Delhi, Jawaharlal Nehru University New Delhi and the central universities. Nevertheless, their contributions to the five Indian journals studied, have not been totally ignored and to a limited extent their contributions as well as those from the universities etc. are reflected in the analysis of CURRENT CONTENTS to be discussed later. The institutions chosen for detailed study were, the Indian Association for the Cultivation of Science, Calcutta, Indian Institute of Astrophysics, Bangalore, Indian Institute of Science, Bangalore, Physical Research Laboratory, Ahmedabad, Raman Research Institute, Bangalore, Saha Institute of Nuclear Physics, Calcutta and the Tata Institute of Fundamental Research, Bombay.

To first get an approximate idea of the quantum of research articles in physical sciences contributed during 1989 from all over India to journals published abroad, 15 issues of CURRENT CONTENTS (Physical, Chemical and Earth Sciences edition) spread over the year 1989, were analysed. The author indices were scanned for names with Indian addresses. Apart from this, data were also collected about contributions from India in 1989 in the leading astronomy journals such as the Astrophysical Journal and its supplements, Astronomy and Astrophysics and its supplements and the Monthly Notices of the Royal Astronomical Society. The data obtained this way has been compared and presented later in the chapter.

6.1 AN ANALYSIS OF ARTICLES PUBLISHED IN THE FIVE JOURNALS

An analysis was made to find out the extent to which different institutions within and outside the country were making use of the five journals (under study) to report their research findings. For this, articles published in these journals during the preceding five year period, 1985 to 1989, were examined.

The analysis has shown that majority of the articles published in Indian Journal of **Physics(IJP)** (53.4%) and

Indian Journal of Pure and Applied Physics (IJPAP) (66%) were received from the **universities /colleges** and those in Indian Journal of Radio and Space Physics (IJRSP) (**56%**), Pramana (50.4%) and the Journal of Astrophysics and Astronomy (**JAA**) (47%) were contributed from research institutions. While JAA published substantial contributions from abroad (**41.6%**), it was much less in the other four journals (IJP **16.3%**, IJPAP **12%**, IJRSP 11% and Pramana 8.4%). We discuss below the quantum of contributions of articles by different groups (**universities/colleges, research institutions, and foreign institutions**) in the five Indian journals analysed. To give a proper quantitative credit to joint authors in a paper, whenever an article had joint authors (say two) belonging to two different institutions, equal credit of (0.5) was given to each institution. ~~When~~ an article was co-authored by three persons belonging to three-different institutions, a credit of 0.33 was given to each institution. ~~When~~ an article had two authors from one institution and one author from another, a credit of 0.66 was given to the institution with two authors and 0.33 to the other institution with a single

author.

6.1.1 INDIAN JOURNAL OF PHYSICS (IJP)

Contributions from Universities/Colleges

IJP published 704 articles/notes during the period 1985–1989. The major contribution (53.4%) to this journal came from universities/colleges. Andhra University, Waltair (16 articles), Anna University, Madras (20), Banaras Hindu University, Varanasi (17), Karnatak University, Dharwad, (11) Mysore University, Mysore, and Delhi University (10 articles each), Shivaji University (12) and University of Gorakhpur (11 articles) were the main contributors.

Contributions from Research Institutions

Around 25% of the total articles published by this journal were from research institutions. The leading contributors among the research institutions were Bhabha Atomic Research Centre (51 articles), Indian Association for the Cultivation of Science, Calcutta (46), Indian Institutes of Technology (27) and Saha Institute of Nuclear Physics, Calcutta (15 articles). There were

just four articles from the Indian Institute of Science, 9 from the Tata Institute of Fundamental Research and none from the Raman Research Institute. A large number of articles from BARC and IACS were contributed to the special issues of the journal brought out during that period. In general, the special issues of the journal increased the number of articles published by the research institutions in this journal.

Contributions from Abroad

About 115 articles (16.3%), were received from twenty countries from abroad, with Egypt contributing 46 articles and the USA 24 articles. Bangladesh contributed 9 articles. It may be mentioned here that in this journal, the rejection rate for articles received from abroad (30.7%) is higher than its overall rejection rate (20%).

6.1.2 INDIAN JOURNAL OF PURE AND APPLIED PHYSICS

Contributions from Universities/Colleges

As in the case of the Indian Journal of Physics, the majority (66%) of the 763 articles published during 1985–89 in this journal was contributed by the universi-

ties and colleges. As can be seen, the percentage of contribution is higher than in the case of IJP (53.4%). Eleven universities - Allahabad, Andhra, Banaras, Gurunanak Dev, Jadavpur, Karnatak, Kumaun, Lucknow, Nagarjuna, Rajasthan and Shivaji Universities, contributed more than ten articles with Gurunanak Dev (18), Karnatak (17) and Bangalore (16) topping the list.

Contributions from Research Institutions

About 21.6% of the articles published were contributed from the research institutions, Out of this a little more than half was contributed by seven institutions with Bhabha Atomic Research Centre and National Physical Laboratory (21 each), Indian Institutes of Technology (25) and the Tata Institute of Fundamental Research(15) leading this group. Again, as in the case of the IJP, special issues brought out by the journal received a good number (perhaps invited) of articles from these organisations.

Contributions from Abroad

Of the 763 articles published in the journal during the period under consideration, 12% were contributed

from 24 countries abroad. As in **IJP**, Egypt contributed the highest number of articles (35) to this journal with Nigeria (12 articles) and Italy and the USA. (with 8 articles each) being the other notable contributors. **It** is observed that 73% of the contributions from abroad were from universities in those countries.

6.1.3 INDIAN JOURNAL OF RADIO AND SPACE PHYSICS

This journal being a bi-monthly, fewer articles were published by **it** as compared to other three physics journals. In **all it** published **254** articles during the period **1985–1989**.

Contributions from Universities/Colleges

Unlike in **IJP** and **IJPAP**, contributions from universities/ colleges were less compared to contributions from research institutions. Thirty nine universities and colleges contributed 32% of the articles published by the journal. University of Roorkee (11 articles), Banaras Hindu University (9), University of Delhi and University of Kerala (6 each) were the main contributors to this journal.

Contributions from Research Institutions

Research institutions contributed 56% of the articles published in this journal, a large number (55) articles coming from the National Physical Laboratory, New Delhi. Other major contributors were the organisations connected with Space Research (like Indian Space Research Organisation, Space Application Centre, Vikram Sarabhai Space Centre and Indian Scientific Satellite Project) which together contributed 20 articles and the Physical Research Laboratory and the Indian Institute of Geomagnetism contributed 14 articles each. The patronage pattern observed is understandable as these organisations are involved in research in ionosphere and space physics, subjects which are rarely pursued in universities and colleges. Perhaps one of the reasons for a large number of contributions from the National Physical Laboratory could be due to the fact that this organisation, apart from being involved in ionosphere work, was at that time headed by the person who was instrumental in starting this journal.

Contributions from Abroad

The journal published 28 articles (11% of total number of articles published) contributed from outside the country. These articles were received from a dozen countries. Federal Republic of Germany (5 articles), Ghana (4) and Australia (3) were the main contributors from outside the country. There was only one article from the USSR and two each from USA and UK.

6.1.4 PRAMANA

As mentioned earlier, 50% of the articles published in Pramana were contributed by research institutions, 41% by the universities/colleges and 8% by institutions abroad.

Contributions from Universities/Colleges

Out of the total 734 articles published during the period 1985-89 in this journal, 302 articles (41%) were contributed by 120 universities and colleges. The major contributors were, Banaras Hindu University (21), Cochin University (20), University of Delhi (15) and University of Madras (16 articles). It is found that these four universities accounted for 23% of the arti-

cles contributed by this group. Contributions from the rest of the universities, though collectively a good number, were individually not significant.

Contributions from Research Institutions

Research Institutions in India contributed 50.4% of the 734 articles published in Pramana, these contributions coming from 38 organisations. A large number of articles (280), were contributed by six Institutions of repute - Bhabha Atomic Research Centre (at Bombay and its centre at Calcutta) and Indira Gandhi Centre for Atomic Research, Kalpakkam) 108 articles, the five Indian Institutes of Technology (56 articles), Indian Institute of Science (40), National Physical Laboratory (18), Physical Research Laboratory (13) and the Tata Institute of Fundamental Research (45 articles). But it is important to note that at least 25% of the articles published by the Bhabha Atomic Research Centre were in the special issues of the journal (conference proceedings and commemoration volumes). It is also important to note that premier institutions like the Tata Institute of Fundamental Research and the Indian Institute of Science contributed only about 6% each (of the

total number of articles published by the journal). And only 9 articles (~11% of its total publication) were published (during the period 1985-89) by the well established Liquid Crystals Group of the Raman Research Institute !

Contributions from Abroad

Pramana published only 62 articles (8.4% of the total publication) from abroad. This is less compared to the number of articles from abroad published in the other three physics journals discussed earlier. Though the journal published articles from 23 countries, 75% of these articles were contributed from four countries - U.S.A (19), USSR (17), Germany (7) and Italy (4). This is in contrast to the other three journals where contributions from developing countries was more (specially from middle eastern countries). Perhaps this has a bearing on the standard of the journal.

6.1.5: JOURNAL OF ASTROPHYSICS AND ASTRONOMY

As this is a quarterly, the number of articles published in this journal is low compared to those in the other journals. Majority (88%) of the articles

published in this journal during the period 1985–89 were contributed by research institutions and from abroad with universities and colleges publishing little in this journal.

Contributions from Universities/Colleges

Unlike in the other four journals discussed above, the contributions from universities and colleges was only 10% of the total number of articles (149) published during 1985–1989. Out of this, three articles were published by the Centre for Advanced Studies in Astronomy (CASA) at Osmania University, Hyderabad. This low percentage indicates that Astronomy is not being pursued much in the universities in the country or the research work done by the universities is reported in journals published outside the country. As we see a little later in this chapter, the second possibility can be eliminated.

Contributions from Research Institutions

Research Institutions contributed 47% of the arti-

cles published by JAA during 1985-89. These contributions were received from about a dozen organisations in the country, with the three centres of Tata Institute of Fundamental Research (at Bombay, Bangalore and Ooty) and the Indian Institute of Astrophysics contributing 30 and 25 articles respectively. Though these numbers look impressive, the contributions from these institutions to foreign journals far exceed those to JAA, as will be seen later. Raman Research Institute published 9 articles in JAA. Although this number is small it represents a large percentage of papers published from this institute.

Contributions from Abroad

Of the 149 articles published, 41% (62 articles) were contributed by 17 countries from abroad. However 10 articles are the papers presented at the IAU Commission 29 meeting on Nucleosynthesis, held during the XIX General Assembly of the International Astronomical Union, at New Delhi in 1985. Out of the 62 articles contributed from abroad, 12 were from the United Kingdom, 8 from the USA and 6 each from France and Greece. It is interesting to note that of the 12 articles from the United Kingdom, 11 were from a single Institute (The Observatory, Cambridge) and were contributed by a member

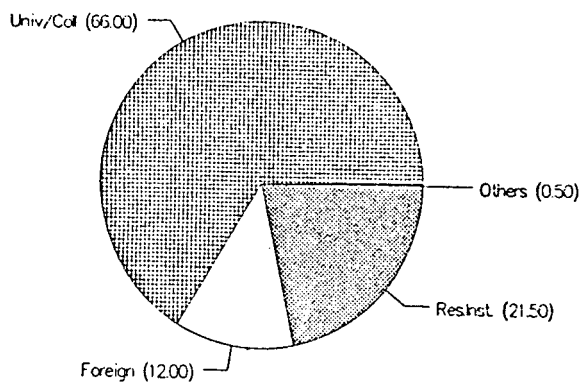
of the editorial board of the journal.

6.2 SOME REMARKS

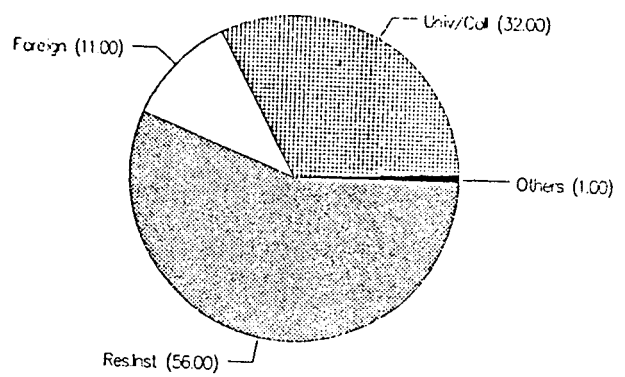
The analysis of the publications pattern in the five journals studied indicates that the journals, Indian Journal of Physics and Indian Journal of Pure and Applied Physics are used more by the universities/colleges and Indian Journal of Radio and Space Physics and Pramana are utilized more by the research institutions. If the contributions in the special issues are not considered, the four physics journals do not receive contributions from the developed countries and are utilized to a *small* extent by the leading research centres in the country. To a lesser extent this is true in the case of Journal of Astrophysics and Astronomy also. The pie diagram (see figure 7) depicts the data presented above for the five journals.

6.3 PUBLICATION PATTERN OF SEVEN RESEARCH INSTITUTIONS IN INDIA

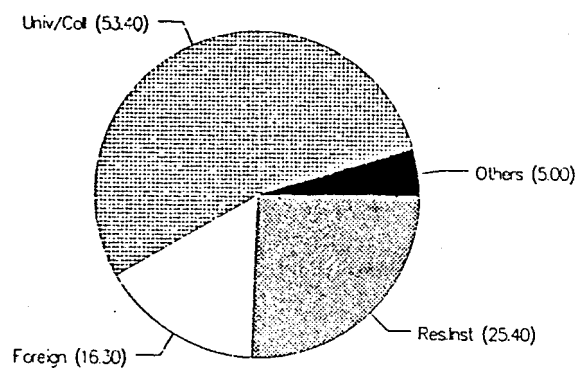
Having got a feel for the contributions of the different groups (like the universities/colleges, research institutions and institutions from abroad) to the



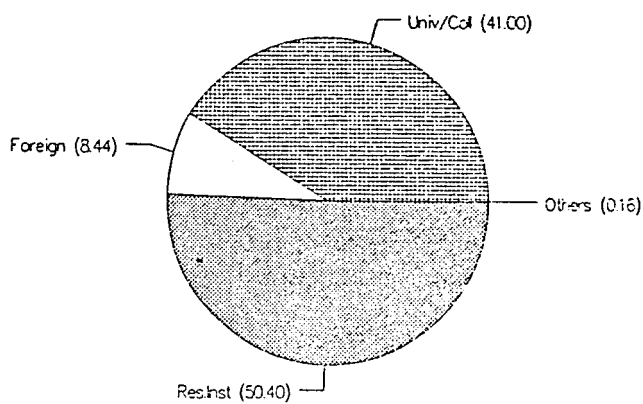
Indian J. Pure & Applied Physics



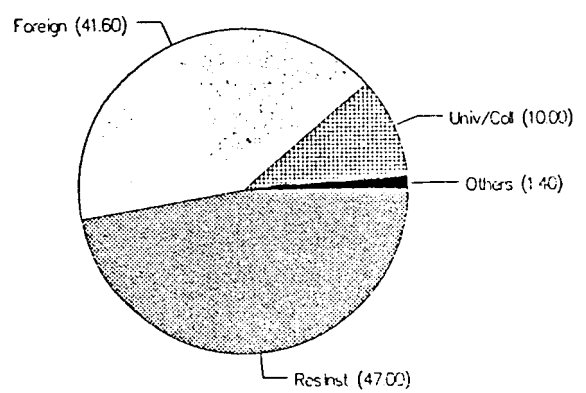
Indian J. Radio & Space Physics



Indian Journal Of Physics



Pramana



Journal of Astronomy & Astrophysics

Figure 7

Percentage of contribution of articles by different groups

five Indian journals, a study was made of the publications output in *journals* (of the research findings in Physics and Astronomy) of the seven research institutions mentioned earlier for the period 1983-84 to 1988-89. These institutions were chosen as they are well established centres in their fields and cover Physics or Astronomy, the two subjects whose journals are the topic of this study. The study was carried out to find out the extent to which the research findings of these institutions were reported in *Indian Journals* and in *Foreign Journals*. For this purpose, only the research articles published in journals were taken into consideration. The papers published in Conference Proceedings (which did not form a part of a journal), books, monographs and Technical Notes have been excluded. It may be added that, as this study is mainly concerned with physics and astronomy, generally articles pertaining to these fields have been considered. However, articles on space physics, cosmogeophysics and material science have also been included in the study. The articles published either as a single authored or as joint authored paper by the researchers of these institutions when they were abroad (reporting results of work carried out there) have been excluded. The data was derived from the Annual Reports of the concerned institutions and in one case the list of publications made available

by the concerned department. It should once again be stressed that the study pertains only to articles appearing in journals and hence the entire publication output is not reflected in this study.. Presented below is the analysis of the publication pattern of the seven institutions.

6.3.1 Indian Association for the Cultivation of Science, Calcutta

Research publications of this organisation in journals pertaining to Physics during 1983-84 to 1987-88 (five year period) was analysed. It was found that during this period 426 articles were published by this centre. Of these, 80% (340 articles) were published in foreign journals and 86 articles (20%) in Indian journals. It is interesting to note that a similar situation prevailed during 1933-1942 when K.S.Krishnan and his associates published from this organisation 52 papers out of which only 11 (21%) were in Indian journals. The situation changed to certain extent during the period 1943-47, when physicists working in this organisation published 50 articles out of which 31 (62%) were in Indian journals. The situation has once again changed during 1983 to 1989. We should recall here

that **it** was at this organisation **Raman** founded the Indian Journal of Physics in the 1920's and **it** is still being published by this Association. **It** is found that during the five year period 1985-1989, this organisation published only 46 articles in the Indian Journal of Physics, 6 articles in *Pramana* and 9 articles in the Indian Journal of Pure and Applied Physics. However, during the period 1985-88, 34 articles were published in *Physical Review*, 29 articles in *Journal of Physics (UK)*, and 12 articles in **Physica** Status Solidi, all the three journals being published from abroad. This clearly indicates that the researchers of this organisation prefer to publish more in foreign *journals* than in Indian journals (see figure 8).

6.3.2 SAHA INSTITUTE OF NUCLEAR PHYSICS, CALCUTTA

Though the name of this Institute (founded by **M.N.Saha** in 1948) suggests that this Institute is concerned with Nuclear Physics, research work is also going on in other areas of physics such as mathematical, quantum and statistical physics, plasma physics, condensed matter physics and high energy physics. Apart from physics, other fields of research at this Institute are biophysics, radiochemistry and radiation/photochemistry and to a small extent astrophysics. The analysis

I. A. C. S. Publications (Physics)

in Indian & Foreign Journals

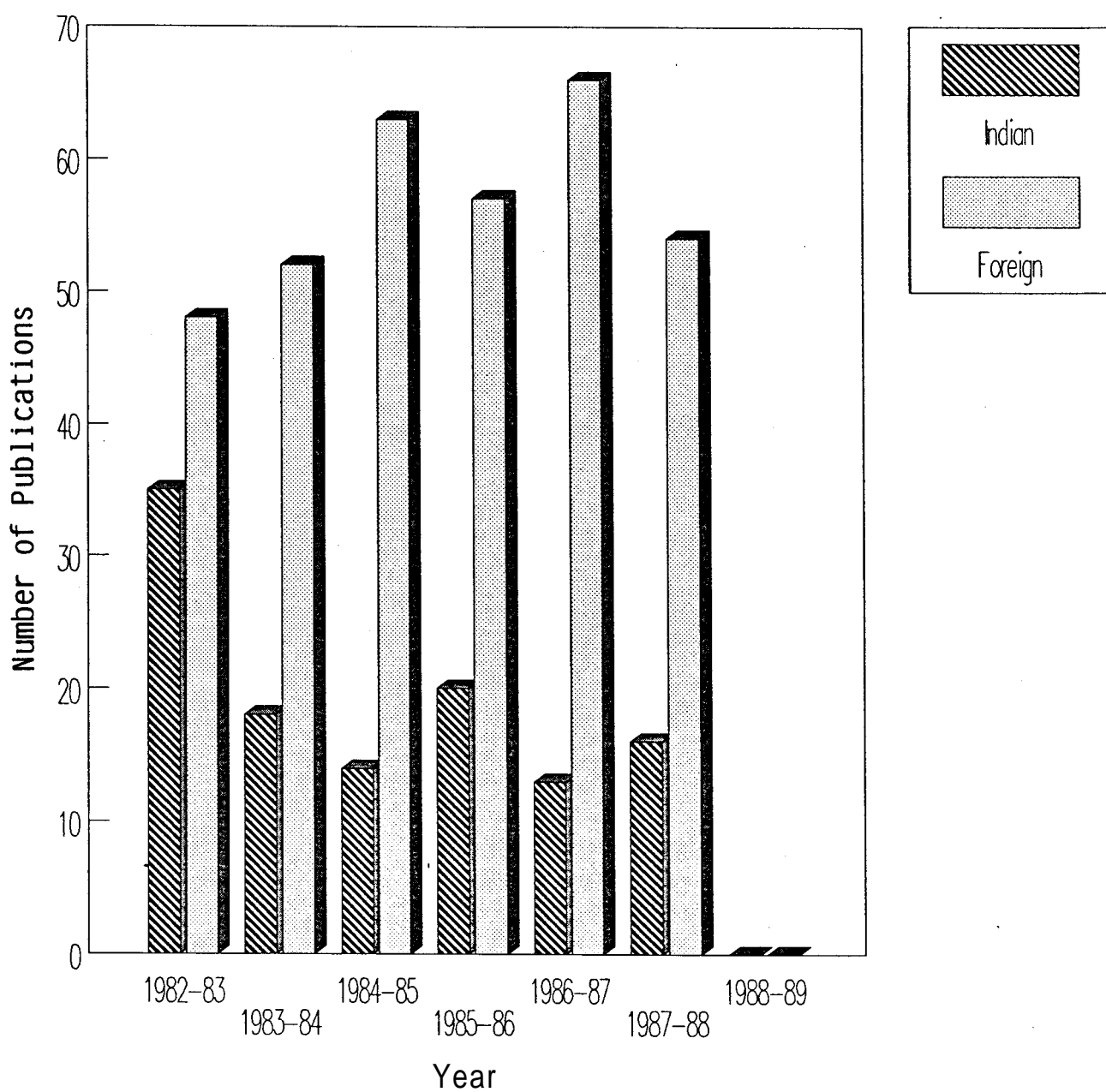


Figure 8

of the physics publications of this 'Institute during April 1983 to March 89 (six year period) shows that 412 articles were published in journals during this period. Out of this 89% (368 articles) appeared in journals published abroad and 11% (44 articles) in Indian journals. It is found that during the period 1985-89, 13 articles were published in Pramana and 15 in Indian Journal of Physics. It is pertinent to point out that just during **one** year period, April 1988 to March 1989, the physicists of this Institute published 13 articles in Physical Review, 13 articles in Journal of Physics (UK), 11 articles in Nuclear Physics and 11 articles in Zeitschrift fur Physik.

The above analysis brings out clearly the preferences of the physicists of this Institute to publish their research findings in large numbers in **Foreign Journals** (see fig 9).

6.3.3 INDIAN INSTITUTE OF SCIENCE, BANGALORE

As mentioned in an earlier chapter, the physics group at this premier Institute was established by C.V.Raman during the early 1930s. A number of well-known physicists of the country have worked at this centre at one time or the other and there has always

Saha Institute Publications (Physics)

in Indian & Foreign Journals

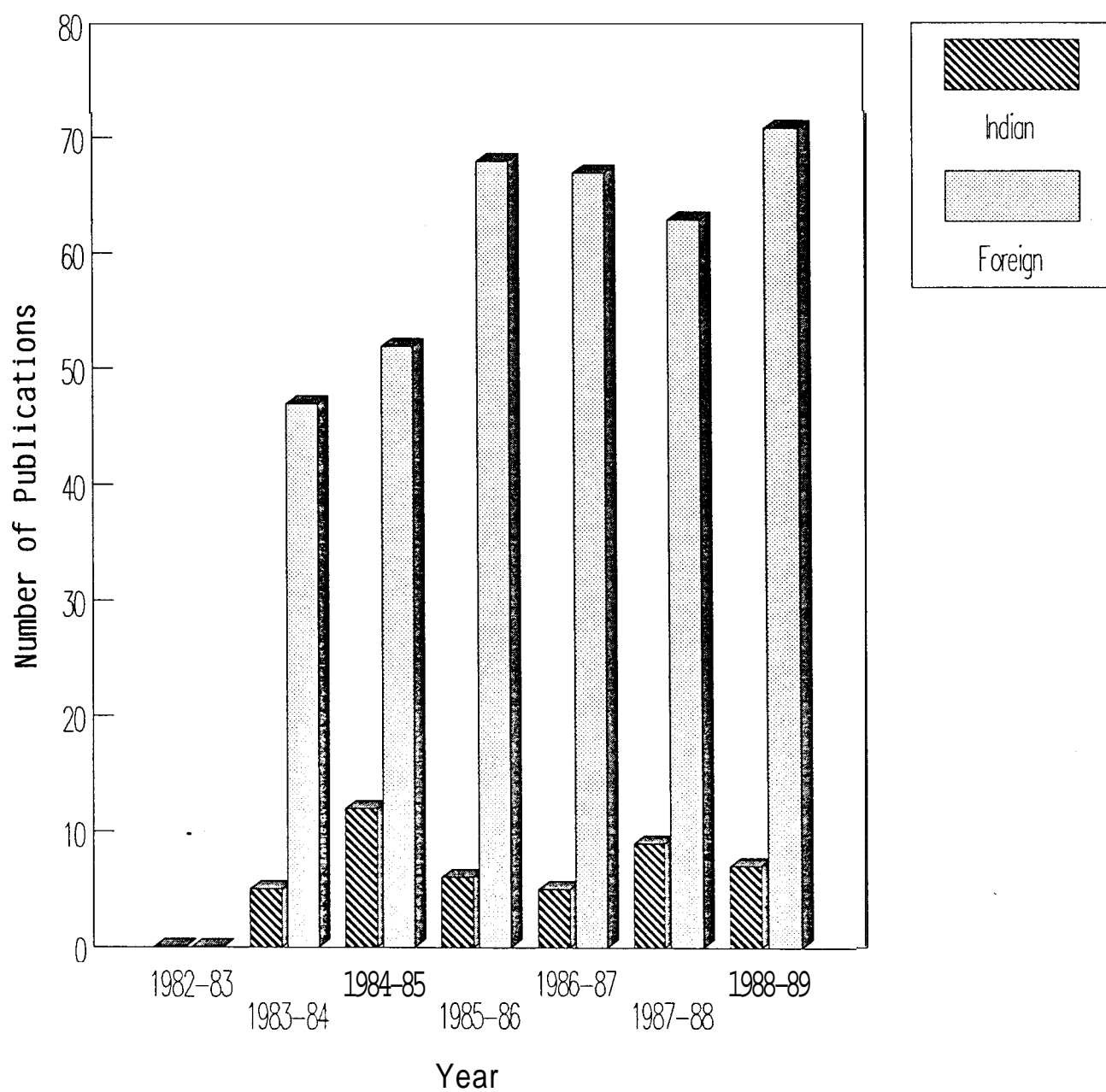


Figure 9

been a strong physics group at this institute. This group has been attracting the attention of leading physicists in the country and is today one of the well-known centres in the country for physics research with a blend of experienced and young physicists working here.

During the period 1983 to the end of March 1989, physicists from this Institute published 302 articles in journals. Out of them 79% (238 articles) were in journals published abroad and 21% (64 articles) in Indian journals. Forty articles in *Pramana* and 4 articles in the *Indian Journal of Physics* were published during the years 1985 to 1989. The analysis shows further that during the period 1988 April to March 1989, 85 articles (which is more than what was published in Indian Journals during the *six year period* 1983-89) were published by this group in foreign journals (see fig 10). Out of these, 18 articles appeared in *Physical Review*, 11 in **Acta Crystallographica**, 5 each in *Journal of Physics* and *Solid State Communications* and 4 each in *Physical Review Letters* and *Physics Letters*.

Thus, it is clearly seen that *Foreign Journals* are the choice of the physicists of this Institute for

publishing their research findings and their contributions in Indian journals are very limited (see figure 10). However, it may be mentioned here that the scientists of this Institute did utilize Pramana to publish their work on high-temperature superconductivity. But this was more an exception than the rule.

6.3.4 PHYSICAL RESEARCH LABORATORY, AHMEDABAD

Established over 40 years ago, the research fields of this institute include, apart from space physics and astrophysics/astronomy, geocosmo physics, atomic and molecular physics, classical and quantum mechanics, particle physics, nuclear and sub nuclear physics, meteorology and climate studies, archaeology and hydrology. The research work of this Institute has been published not only in journals devoted to astronomy and physics, but also in geology, geophysics and mechanics journals.

Publications Of the Physics Group

During the period April 1983 to March 89, 203 articles were published by this group in physics. Out

I. I. Sc. Publications (physics)

in Indian & Foreign Journals

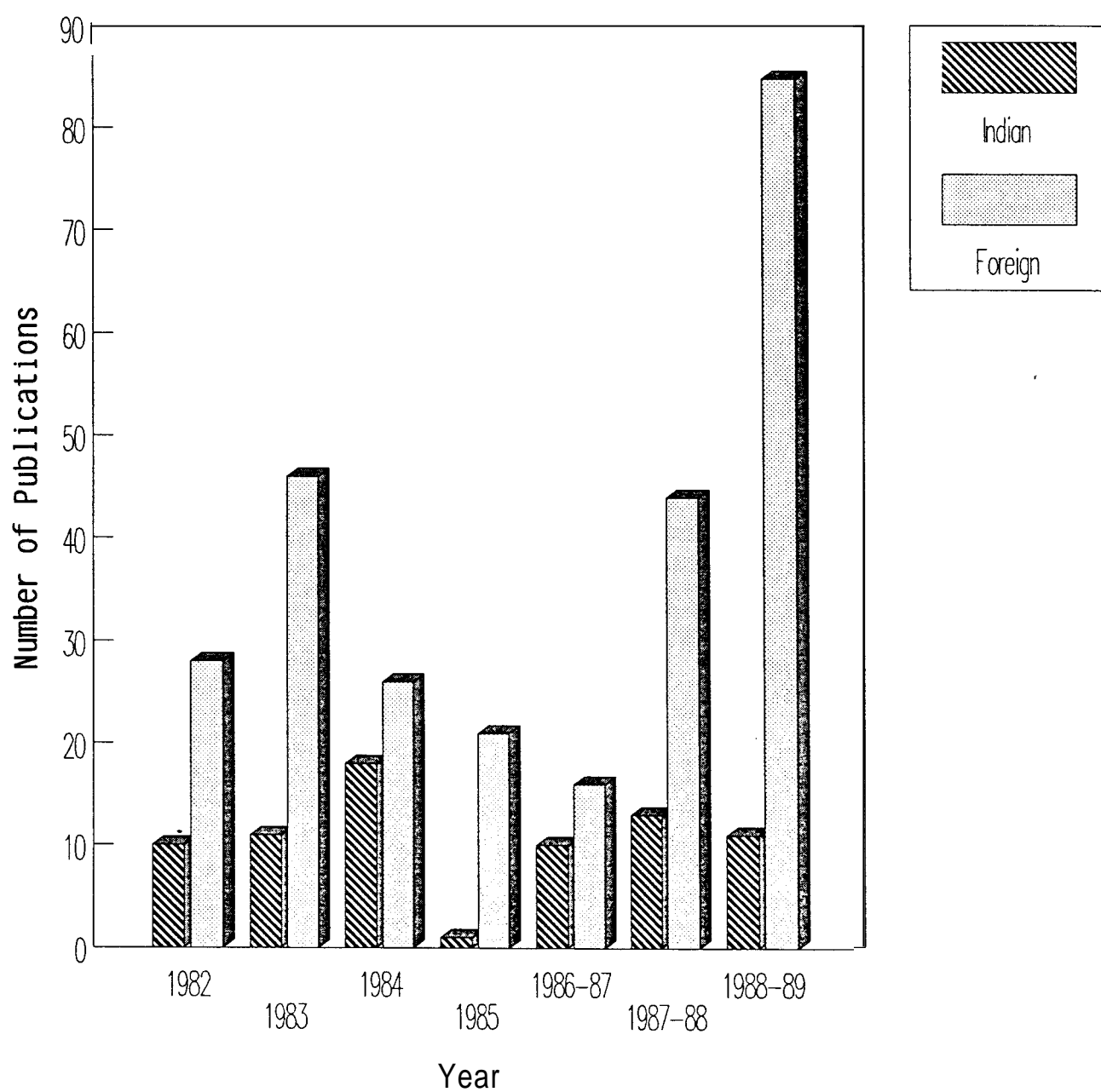


Figure 10

of this 79% (160 articles) were in journals published abroad and 21% in Indian Journals. During the five year period 1985-89, 13 articles were published in Pramana and 5 articles in the Indian Journal of Pure and Applied Physics and one article in Indian Journal of Physics. In 1988-89 (April to March), 5 articles were published in the Physical Review (it was the same number in IJPAP but published over a period of five years), 2 articles in Annals of Physics and one article each in Physics Letters and Zeitschrift fur Physik.

Publications Of the Astronomy Group

In astronomy/astrophysics (space physics included), 168 articles were published during the same period (1983 April to March 89). Out of this 74% (124 articles) were in *foreign journals* and 26% (44 articles) in *Indian journals*. It is found that only 14 articles were published by the astronomers/astrophysicists of this Institute in the Indian Journal of Radio and Space Physics and two articles in the Journal of Astrophysics and Astronomy during the five year period 1985-89.

This analysis shows that both physicists and astronomers of this organization prefer to publish their

research findings more in *Foreign Journals* than in *Indian Journals* (see figures 11 & 12).

6.3.5 TATA INSTITUTE OF FUNDAMENTAL RESEARCH

The publications of the physics and astronomy groups of this Institute during the period 1983-84 to 1988-89, were analysed separately to find out the preferences of these groups for publishing their research findings. As mentioned in a previous chapter, this centre's research in astronomy is carried out not only at Bombay but also at Ooty (where the radio telescope is located) and Bangalore. Recently (in 1990), the astronomy group at Bangalore and a good portion of the group from Ooty have moved to Poona where a new project GMRT (Giant Metre wave Radio Telescope) is under way.

Publications Of the Physics Group

It is found that 89% of the 678 articles published by the physics group during the period (1983 April to March 89) was in *foreign journals* and only 11% in *Indian journals*.

P. R. L Publications (Physics)

in Indian & Foreign Journals

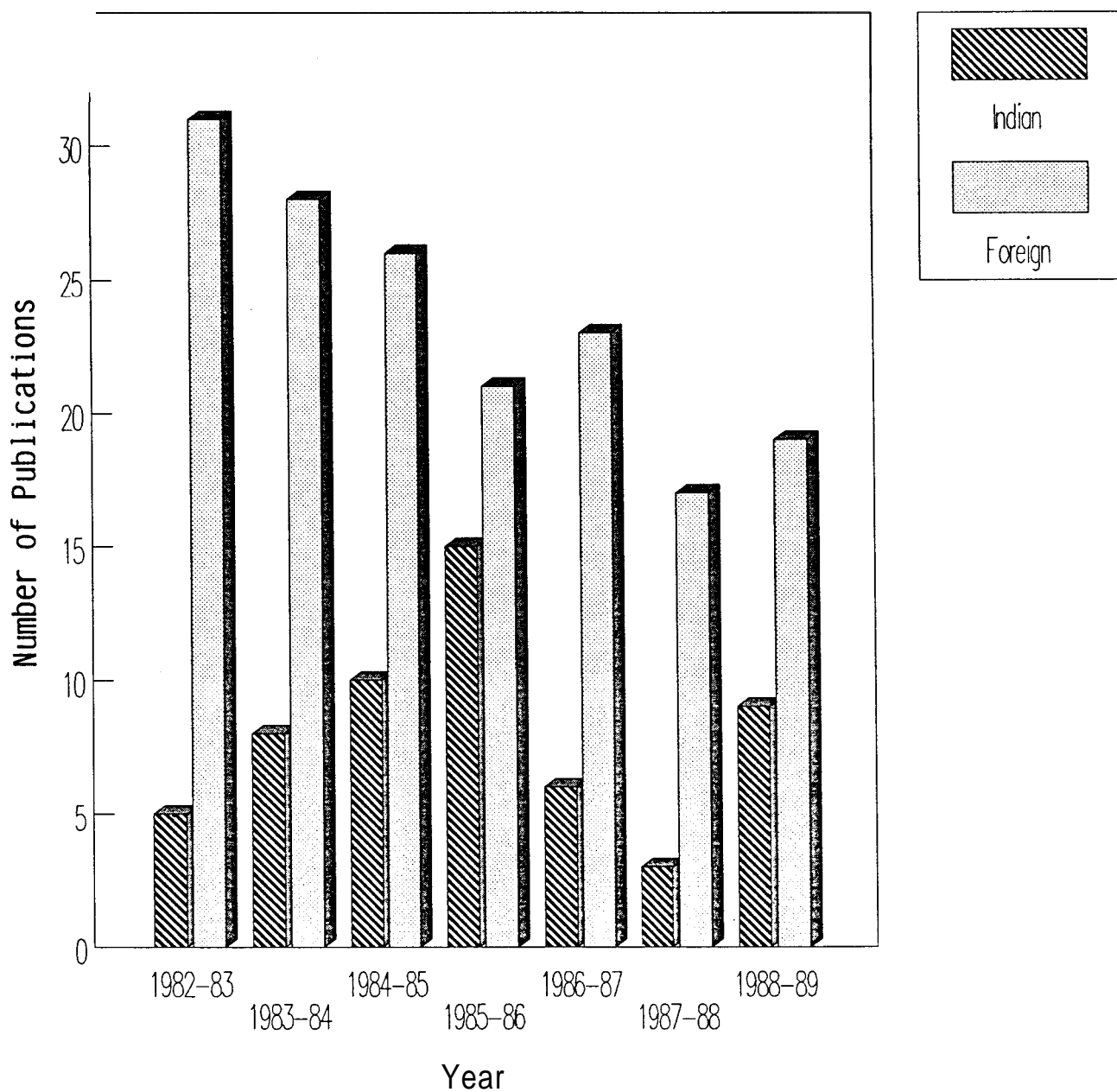


Figure 11

P. R. L Publications (Astronomy) in Indian & Foreign Journals

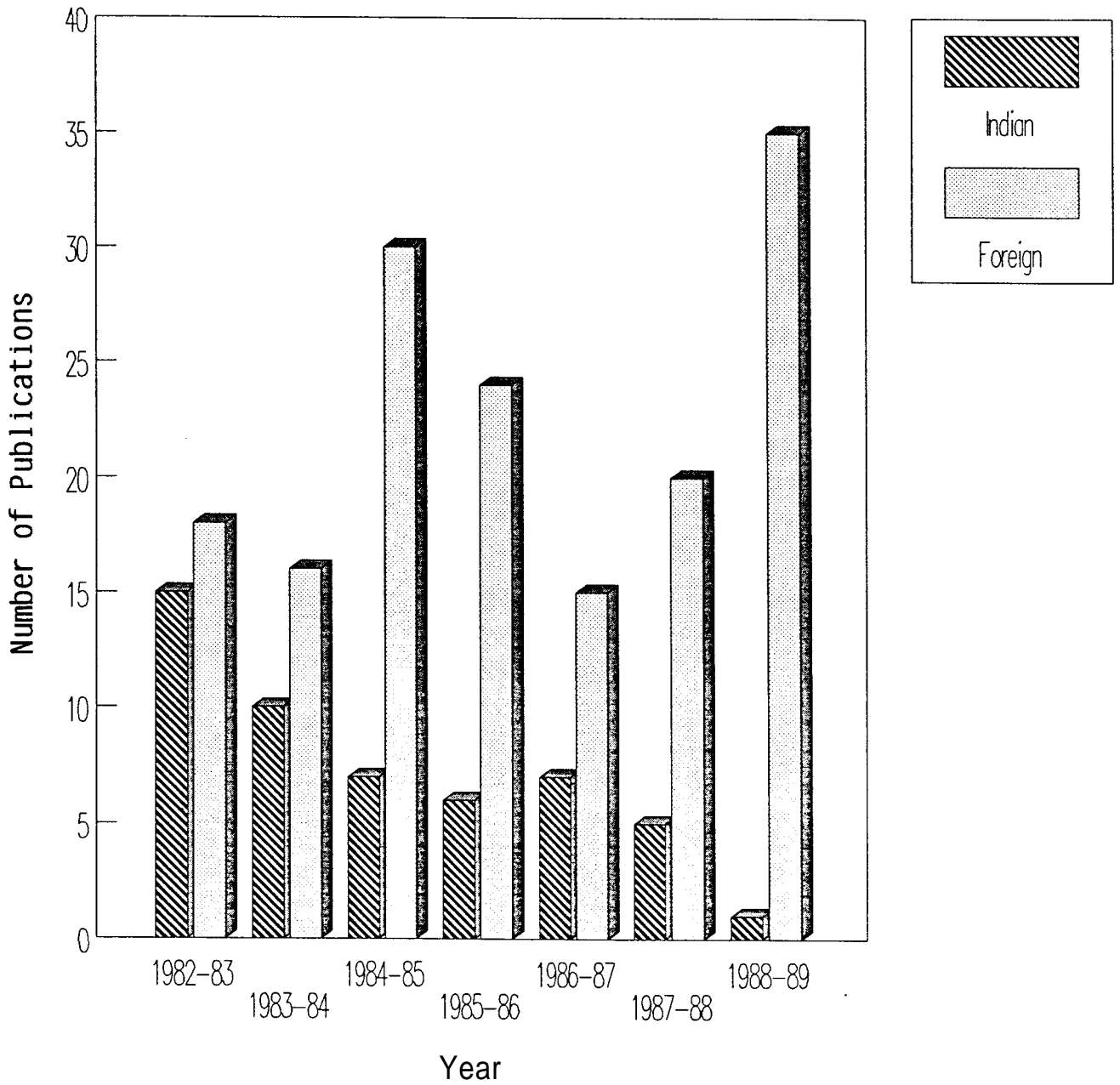


Figure 12

The contributions from this Institute during 1985-89 to the four Indian physics journals considered in this study were, 45 articles in *Pramana*, 15 in *Indian Journal of Pure and Applied Physics*, and 10 in *Indian Journal of Physics*. About 20% of these articles were contributed to the special issues brought out by these journals. The research findings of the physicists appeared in a number of foreign journals during the period 1985-1989, and some of the important journals in which they appeared were *Physics Letters* (65 articles), *Physical Review* (45), *Physical Review Letters* (20), *Journal of Physics* (46), *Nuclear Physics* (20) and *Zeitschrift fur Physik* (40 articles).

Publications Of the Astronomy Group

This Institute which has well established Radio Astronomy and Astrophysics groups published 427 articles during the period 1983 to 1989. Out of these, 361 articles (84.5%) were published in *foreign journals* and 66 articles (15%) were published in *Indian journals*. This group contributed 30 articles to the *Journal of Astrophysics and Astronomy* during the years 1985 to 1989. An analysis of the articles published by this group in 1989 alone showed that 14 articles were pub-

lished in Astrophysical Journal and its supplement series, 6 articles in Monthly Notices of the Royal Astronomical Society and two articles in Astronomy and Astrophysics. It should be mentioned here that these three journals are important core journals in the field well known among the astronomers all over the world. During the same year(1989), six articles were published by this group in Journal of Astrophysics and Astronomy (out of which two articles were joint papers published in collaboration with astronomers outside the country).

The analysis of the publications of the scientists of this institute over the last six to seven years, indicates that *Foreign Journals* are used much more than *Indian Journals* for publishing their research findings (see figures 13 & 14). This practice has been steadily increasing over the years with both physicists and astronomers of this Institute.

6.3.6 RAMAN RESEARCH INSTITUTE, BANGALORE

This Institute, as mentioned in an earlier chapter was founded by C.V.Raman around 1948 and was reorganized during 1971-72. The main areas of research at this Institute are, Astrophysics/Radio Astronomy, Theoretical

T. I. F. R. Publications (Astronomy)

in Indian & Foreign Journals

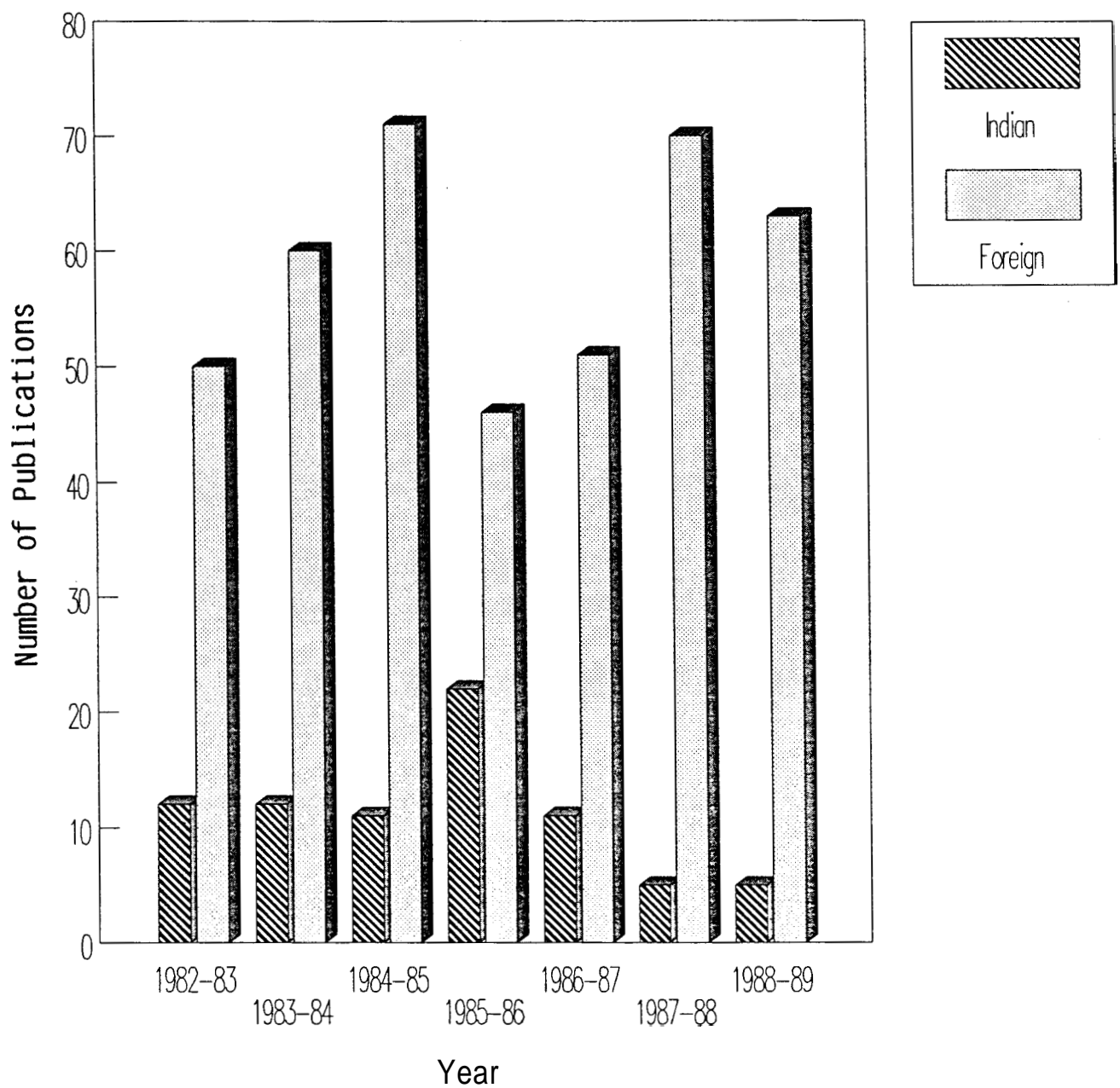


Figure 13

T. I. F. R. Publications (Physics)

in Indian & Foreign Journals

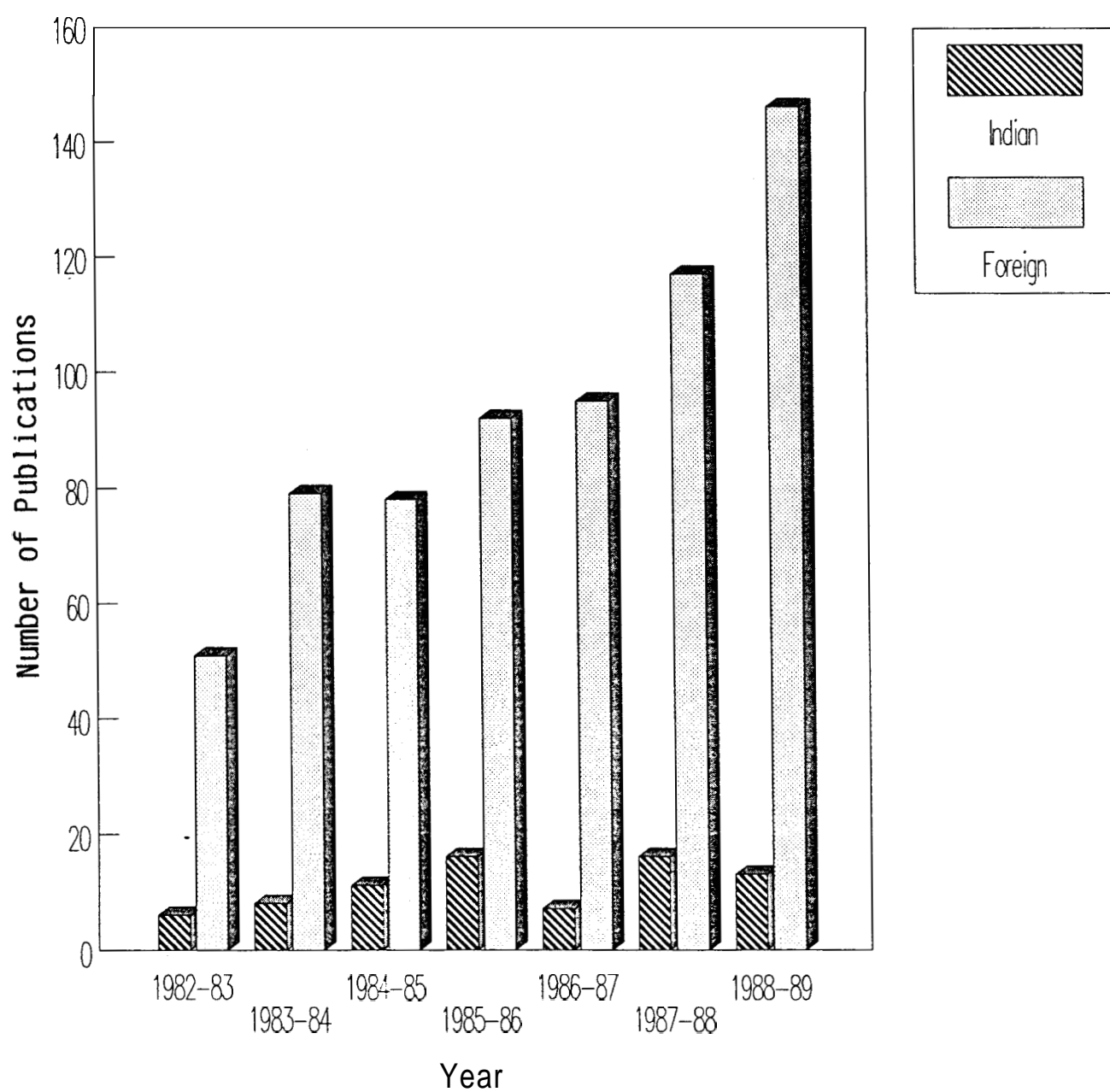


Figure 14

Physics and Liquid Crystals with the Liquid Crystal group being one of the well known groups in the field. **It** has a field station at Gauribidanur (a joint project with the Indian Institute of Astrophysics) where a radio telescope has been functioning and has recently (1989) taken up another new project at Mauritius to build a low frequency radio telescope.

Publications of the Theoretical Physics and Liquid Crystals Groups

Publications of the research work of these groups have been largely in journals **published abroad**. Out of the 163 articles published in journals during the period 1983 April to March 1989, 86% (143 articles) were in **foreign journals** and **14%** in Indian **journals**. During 1985-89, this group **published only ten** articles in **Pramana** and none in the Indian Journal of Physics. However, in 1976, the liquid crystals group published one of the important discoveries in liquid crystals (and perhaps the most important work of this group) relating to '**discotic liquid crystals**' in **Pramana**. This paper was well received and is highly quoted. But even this factor has not sufficiently induced this group to **publish more papers** in **Pramana** or any other Indian journal.

Publications Of the Astronomy/Astrophysics group

In contrast to the liquid crystals and theoretical physics groups, the astrophysics and radio astronomy group of this Institute contributed to Indian and foreign journals *equal* number of papers during the period April 1983 to March 89. However, the total number of papers (44) published by this group during this period is less compared to that of the liquid crystals and theoretical physics groups. Out of the 44 papers published in journals, 22 were published in Indian journals and 22 in foreign journals. This group published six papers in Journal of Astrophysics and Astronomy and 5 papers in Current Science during 1985-89. In 1989, it did not publish any paper either in Astrophysical Journal or in Astronomy and Astrophysics and published one paper in Monthly Notices of the Royal Astronomical Society.

Thus, this study shows that the physicists of this institute, as seen in the case of physicists at other institutions discussed earlier, publish their research findings *more* in journals published *outside* the country than in journals published within the country (see figures 15 & 16). The astronomers working at this insti-

R.R.I Publications (Physies)

in Indian & Foreign Journals

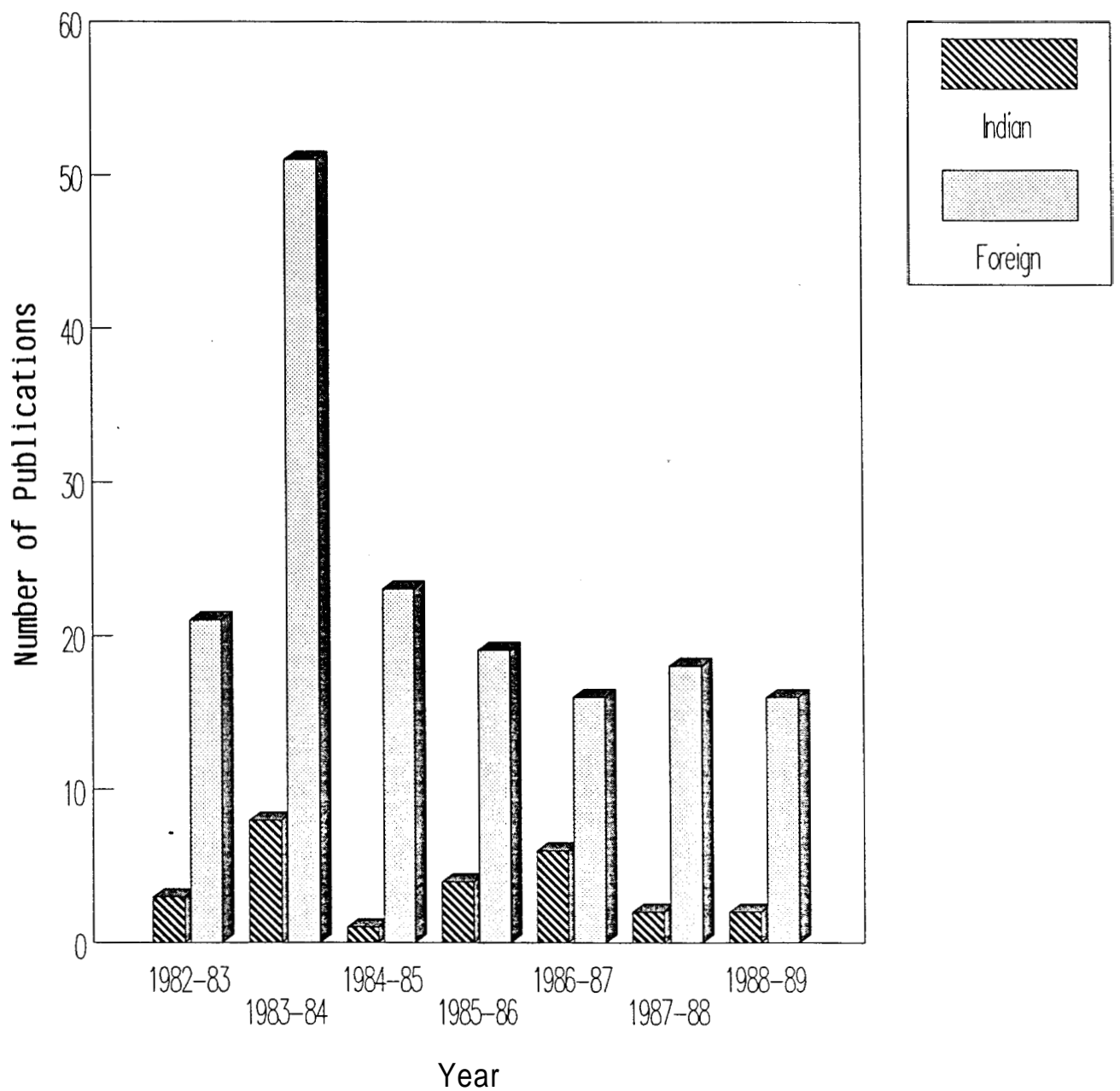


Figure 15

R. R. I. Publications (Astronomy)

in Indian & Foreign Journals

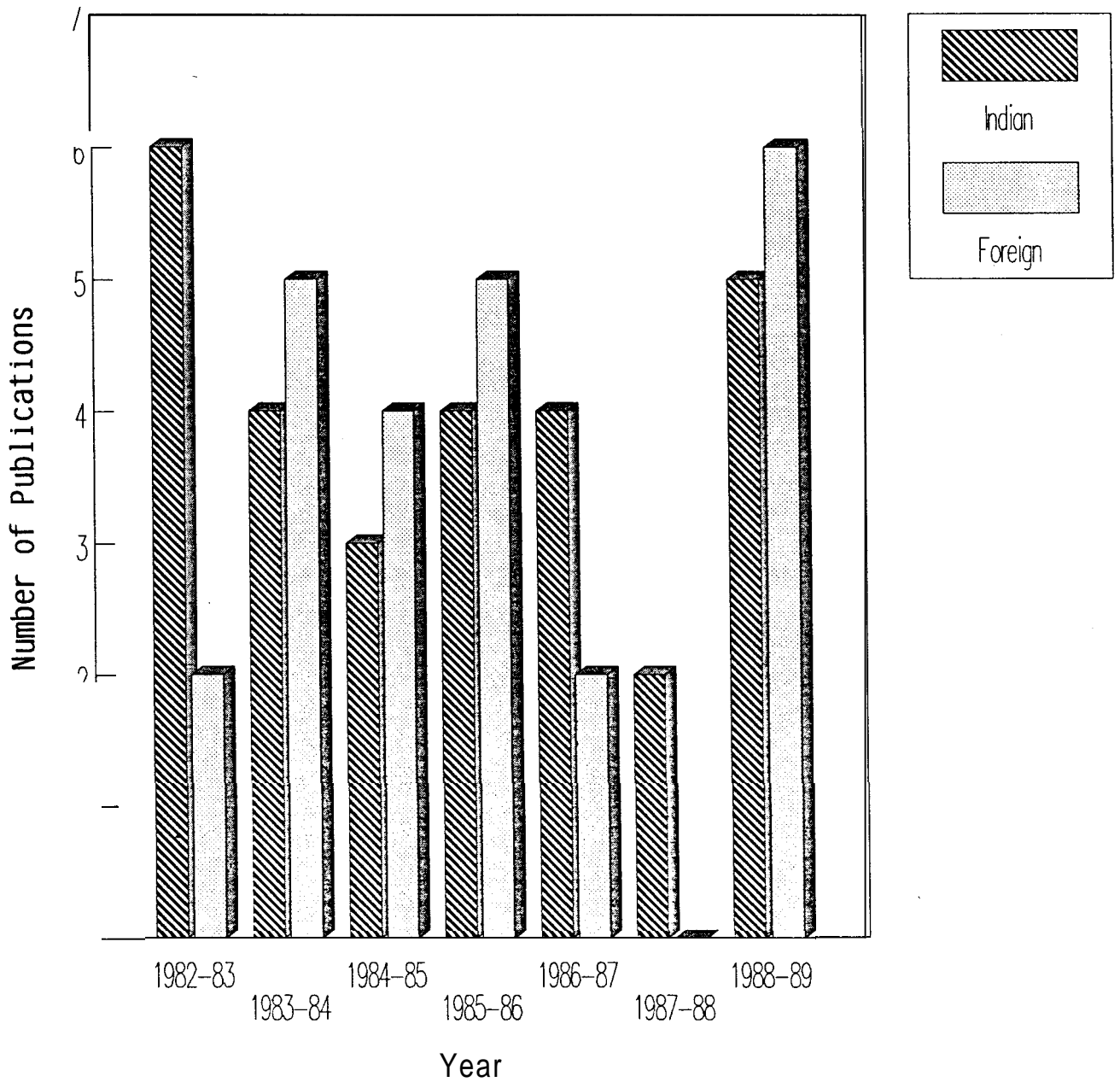


Figure 16

tute are found to publish at least an equal number of papers in journals published within the country and outside the country and is the only group among the Institutions considered in this study to do so.

6.3.7 INDIAN INSTITUTE OF ASTROPHYSICS, BANGALORE

The main area of research at this institute is astronomy and astrophysics with both theoretical and observational work going on. Apart from its main centre at Bangalore, **it** has three field stations, at Gauribidanur (a joint project with the Raman Research Institute), at Kavalur (where **it** has its new optical telescope) and at Kodaikanal (where the Institute was located before **it** moved to Bangalore).

During the year 1983 April to March 89, the research work of this Institute was reported in 350 articles. Of these, 219 articles (63%) appeared in *foreign journals* and 131 articles (37%) appeared in *Indian journals*. The researchers of this Institute published 25 articles in Journal of Astrophysics and Astronomy during the period 1985-89. In 1989, they published 5 papers in the Monthly Notices of the Royal Astronomical Society, 4 papers in Astronomy and Astrophysics and one paper in Astronomy and Astrophysics Supplement Series

and one joint authored paper in Astrophysical Journal and 8 articles in Journal of Astrophysics and Astronomy. We should mention here that the articles published in the three foreign journals mentioned above are not the total number of papers published in foreign journals (see figure 17). We have taken into consideration only articles published in the top astronomy journals.

Analysis of the publications of this institute has shown that the researchers of this Institute published their work slightly *more in foreign journals*, but their contributions to Indian journals was not *insignificant*. (However we must mention here that not all articles published in Indian journals were in journals internationally refereed).

Contributions from the seven institutes :

Total contributions of the seven research institutes whose publications were studied, to physics and astronomy articles in the Indian and foreign journals are given in table 14.

I. I. A. Publications in Indian & Foreign Journals

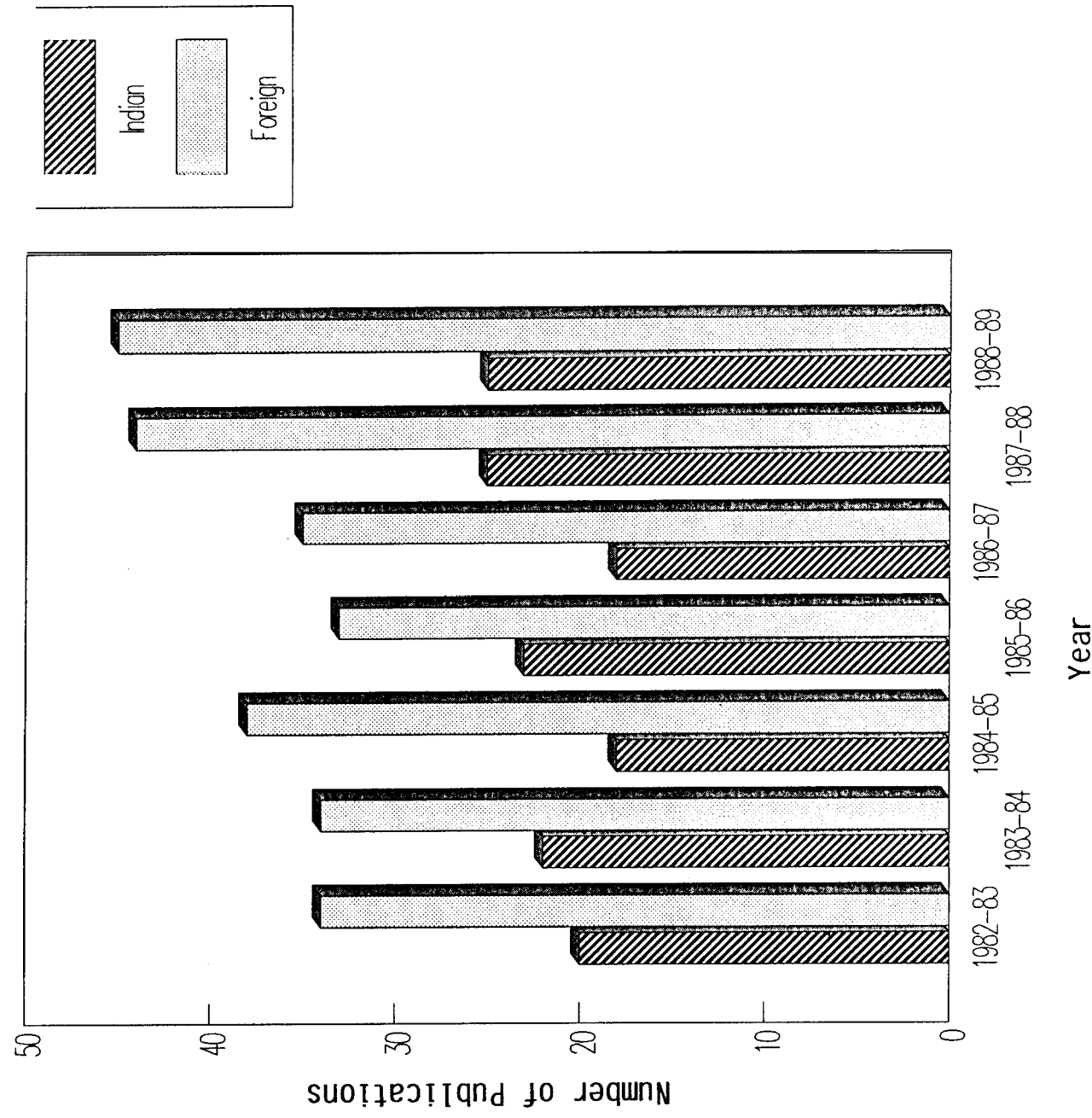


Figure 17

TABLE 14

Number of articles published in **Physics & Astronomy** in **Indian** and **Foreign** journals by seven research institutions during 1982-83 to 1988-89

	1982-83		1983-84		1984-85		1985-86		1986-87.		1987-88		1988-89		TOTAL		
	Ind.	For.	Ind.	For.	Ind.	For.	Ind.	For.	Ind.	For.	Ind.	For.	Ind.	For.	Ind.	For.	
Indian Association for Cultivation of Science (Physics)	35	49	18	52	14	63	20	57	13	66	16	54	N/A	N/A	116	340	
Raman Research Institute (Physics)	3	21	8	51	1	23	4	19	6	16	2	18	2	16	26	164	
Raman Research Institute (Astronomy)	6	2	4	5	3	4	4	5	4	2	2	-	5	6	28	24	
Physical Research Laboratory (Astronomy)	15	18	10	16	7	30	6	24	7	16	5	20	1	3	5	51	158
Physical Research Laboratory (Physics)	5	31	8	28	10	26	15	31	6	23	3	17	9	19	56	175	
Tata Institute of Fundamental Research (Physics)	6	51	8	79	11	78	16	92	7	95	16	117	13	146	77	658	
Tata Institute of Fundamental Research (Astronomy)	12	50	12	60	11	71	22	46	11	51	5	70	5	63	78	411	
Saha Institute (Physics)	N/A	N/A	5	47	12	52	6	68	5	67	9	63	7	71	44	368	
Indian Institute of Astrophysics	20	34	22	34	18	38	23	33	18	35	25	44	25	45	151	263	
Indian Institute of Science	10	28	11	46	18	26	1	21	10	16	13	44	11	95	74	266	

N/A : Data Not Available

6.4 ANALYSIS OF CURRENT CONTENTS

The analysis of data from 15 out of 52 issues of Current Contents of 1989 (the issues were spread over the whole year) showed that a good number of articles were published in foreign journals from India in Physical Sciences, Chemical Sciences and Geosciences in 1989 (the fifteen issues listed 1,055 articles and this number will be much higher when all the 52 issues of Current Contents for 1989 are examined). Articles in Physics were published by physicists working not only in the seven institutions whose publications were analysed but also those at other research centres and universities. Similarly articles were published by astronomers in journals other than the three foreign journals analysed. A large number (22) of articles were published in the journal Astrophysics and Space Sciences whose standing is not in the same level as either Astrophysical Journal, Astronomy & Astrophysics or the Monthly Notices of the Royal Astronomical Society (however, contributions from the universities to astronomy journals published abroad was negligible). Articles in physics and astronomy were published both in journals of good standing and otherwise. Some of the physics articles published were in journals such as the differ-

ent sections of The Physical **Review**(57 articles), Physical Review **Letters**(8 articles), different sections of Journal of Physics (34 articles), Nuclear **Physics**(7), Nature (7) and Zeitschrift fur **Physik**(10). Ten physicists who were asked to rate these journals for their quality, felt that these journals were among the top physics journals in the world.

6.5 FINDINGS OF EARLIER STUDIES

There have been a number of bibliometric and citation studies on different aspects of Indian science publications. We mention below a few of those which have some relevance to the present study.

Mehrotra and Lancaster (1984) used the Science Citation Index to analyse the literature covered by it pertaining to the period 1979 to June 1981. Their study covered the entire field of science. They analysed 3,378 articles (picked from the Science Citation Index as random samples) and found that 42% of the papers analysed were published from India and almost 50% of this was in national journals. Out of this 67.6% were published by Institutions of higher education (Universities, Indian Institute of Science, and the five I.I.T's

included), 22.6% by the Government agencies (like the C.S.I.R laboratories, Department of Atomic Energy, the various Councils like the Agriculture, Medical etc.) .

Arunachalam and Hirannaiah (1978) studied ten issues of Current Contents (Physical and Chemical Sciences edition) for the period March 1977–May 1978. In this sample they found 1,009 articles from India, more than 50% of them were in foreign journals. They concluded that *highly rated Indian Institutes of Technology, Bhabha Atomic Research Centre and the Tata Institute of Fundamental Research appear to publish more in foreign journals and Physical research Laboratory and Indian Institute of Science divide their papers between Indian and foreign journals*. However, the present study pertaining to a more recent period *does not show this to be the case* and indicates a change in the trend.

In a different type of study, Ratnakar (1984) found that the *members of the editorial board of Pramana published (during the period 1978–81) only 16 articles in that journal while they published 151 articles in other journals during the same period indicating their preference of other journals to Pramana* for publishing their research findings.

Krishnan and Viswanathan (1987) found that *the majority of the fellows of the Indian National Science Academy preferred to publish more in foreign journals.*

6.6 SIGNIFICANT POINTS EMERGING FROM THE ANALYSIS

The analysis of the contributions in the five Indian journals (during the period 1985 to 1989) by the different groups in the country and from abroad, and the publications of the physicists and astronomers of the seven research institutions in the country (for the period 1983 April to March 89) taken together, leads us to the following important conclusion:

1. *Contributions to the Indian Physics journals by the well established research Institutions in the country is minimal.*
2. *A good portion of the articles received from abroad by the Indian physics journals studied were from middle eastern countries. Interestingly as mentioned in the previous chapter (chapter 5) the rejection rate in IJP for the articles received from abroad is higher than for those received from within the country.*
3. *Physicists of the Institutions whose publications during 1983-89 were analysed, published 85% of their research papers in foreign journals and only 15% in Indian journals indicating clearly that their choice of journals for publishing the results of their research work to be foreign journals.*

4. *Astronomers in the country published during the same period (1983-89) 73% of their research papers in journals published abroad and 27% in Indian Journals. In 1989, 44 articles were published in three leading astronomy journals published outside the country while only 31 papers were published in the Journal of Astrophysics and Astronomy*
5. *The choice of the journals of the astronomers in the country for publishing their research findings is, as in the case of physicists, Foreign Journals*
6. *The analysis of Current Contents indicates that a good quantity of research work done in India in Physics and Astronomy gets published outside the country and that there are very few contributions from the universities to either Indian or foreign astronomy journals.*

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