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Publications Trends in Nuclear Physics: A Global Perspective

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Abstract

This paper attempts to highlight the publication status and growth of nuclear physics research across the world by way of analyzing various features of research output based on Web of Science database. A total of 32286 publications were published on nuclear physics during the period 2004-2013. It was found that the number of published articles was higher in USA, Germany, Japan, Italy, France, China and Russia, etc. The highest number of publications 5,407 (16.75%) was published in 2012. The average number of publications published per year was 3228.6. The highest growth rate (64.90%) was observed in 2012. Out of the total publications 93.30% of contributions were collaborated with multi authorship and 6.70% of contributions were collaboration with single authors. The highest value of collaboration coefficient (CC) was 0.62 in 2008. Overall collaboration rate was very high. Physics and Astronomy accounts for the largest share 23413 (72.52%) of publications in the total worldwide output on nuclear physics followed by Medicine with 6608 (20.47%) publications.

Keywords: Nuclear physics, scientometrics, annual growth rate, author productivity, co authorship index and collaboration coefficient

1 Introduction

Nuclear physics is a subject that analyses the atomic nuclei and studies its constituents and their interactions. An important application of nuclear physics is the power generation based on nuclear fission or fusion. Other applications of nuclear physics are in various fields like medical treatments for patients, water resources, on line analysis of coal, environmental tracers radio isotopes instruments and radiocarbon dating in geology and archaeology. Particularly the application in medicine has far reaching effects in the human development and its well beings. So a lot of research is carried out on this topic all over the world and a lot of publications take place round the year. So that we take the initiative to analyze and document these publication works.

Scientometrics is used as an assessment method of scientific production. One important way to track the activities in the field of science and technology is the study of scientific literature. For many years scientometric analysis has been increasingly used to evaluate the research performance of researchers and the developments in various disciplines of sciences. The analysis evaluates the publications and activities of researchers all over the world. It will be used to evaluate institutions based on their contributions on the particular discipline they belong. The scientometric may be used for facilitating to understand the development in any discipline, this

paper presents trends and pattern in growth, contributions of a particular author and institutions in the field of nuclear physics and it forecast the future trends and pattern of growth.

2 Review of Literature

The literature of Scientometric is now growing rapidly, and this paper attempts to review the related literature and summarize the important research findings related to nuclear physics aspects of the present study.

Davarpanah[1] (2012) analysed the quantitative and qualitative assessment of the status of nuclear science and technology in Iran, the study was based on data obtained from the Science Citation Index Expanded from 1990 to 2010. He observed the exponential growth of Iranian nuclear literature and the strong emphasis on physics and chemistry. The study also revealed that academic institutions are the main source of the country's nuclear literature and that they preferred to publish in three journals, namely, Annals of Nuclear Energy, Physical Review C and Nuclear Physics A. Kademani[2], B S et al. analysed 65592 publications on zirconium in nuclear science and technology using the INIS database as a tool. The study focused on the broad features of zirconium literature such as year-wise distribution of publications, geographical distribution of publications, country-wise activity index, domain-wise distribution of publications and highly productive institutions. Sagar[3], A et al (2010) have presented the growth of literature on cobalt-60 research in nuclear science and technology by way of analysing various characteristic of research output such as the growth of publications, country wise distribution of publications and publication productivity.

Rekha[4], et.al (2010) analysed the publications of Nuclear Physics divisions and Bhaba Atomic Research Centre. There are 257 research papers published during 2003-2008. The highest number of publications (51) was in the year 2006. The average number of publications per year was 42.83. The publications of Nuclear Physics division were spread over 42 journals. There were more than 70% Mega authored publications. Sagar[5], A et al. (2009) made an attempt to quantitatively analyse the growth and development of research in Neutron Activation Analysis (NAA) in terms of publications. As per the International Nuclear Information System (INIS) database during 1993-2007, a total of 6491 publications were published. The highest number of papers in a year (615) was published in 2004. The average number of publications published per year was 432.73. Japan topped the list with 605 publications followed by the USA with 468. The authorship and collaboration trend is towards multi-authored papers. Kademani[6], B S et al (2007) made an attempt to analyse the growth and development of web-resources in Nuclear Science and Technology as reflected in the International Nuclear Information System (INIS) (1996-2005) database. During 1996-2005, a total of 102,720 publications appeared in 1,526 web-resources contributed by the nuclear scientists in various areas of research. The highest number of publications in web-resources published was 25,813 in 2005. The average number of publications in web-resources published per year was 10,272.

Garrido[7] (2007) reviewed the nuclear research output in terms of publications using 920 nuclear science papers published between 1986 and 1994. Unlike the aforementioned study in India that used data from the INIS Database only, this study combined bibliographic references from the INIS Database as well as proceedings and annual reports listed elsewhere. The papers were analysed by subject, institutions, authors, co-authorship, publication year, publishing journals, geographic origin and language of publication. Sagar[8], A et al. (2007) analysed the quantitatively the growth and development of Mass Spectrometry research in Nuclear Science and Technology in terms of publication output as reflected in International Nuclear Information System (INIS) database (1970-2005). A total of 10913 papers were published in various domains. The highest number of papers (816) was published in 2004. The average number of publications published per year was 303.13. United States topped the list with 2247 publications followed by Germany with 1333 publications. Authorship and collaboration trend was towards multi-authored papers as 81.83 percent of the papers were collaborative is indicative of the multidisciplinary nature of research activity.

Kademani[9] et al. (2006) investigated the growth and development of nuclear science and technology research in India based on their publication output from 1970 to 2002 with the INIS Database as a data source. They observed a high level of local and international collaboration in India and also noted that the main channel of communicating research results was peer reviewed journals and that over 60% of the Indian records in the INIS Database were journal articles. Kademani[10], B S et al. have made an attempt to detail the quantitative analysis of Indian contributions on thorium in terms of publications output as per INIS database during 1970-2004. A total of 2399 papers were published by the Indian scientists in the field of thorium. Kademani[10], B S et al (2006) analysed the quantitatively the growth and development of Nuclear Science and Technology research in India in terms of publication output as reflected in International Nuclear Information System (INIS) (1970-2002) database. Year-wise growth of publications and input of records to INIS database by India and other countries were analyzed. The average number of papers published per year was 1676.15.United States is the top producer of scientific output with 397568 (16.85%) publications in this field. Authorship and collaboration trend was towards multi-authored papers.

3. Objectives for the Study

The objective of the study was to perform a scientometric analysis of all nuclear physics publications in the world. The parameters studied include:

- Forms of publications
- Annual growth rate, compound annual growth rate, relative growth rate and doubling time of publications

- Authorship pattern of publications
- Relative citation impact of highly productive countries
- Highly productive institutes
- Highly preferred source titles for publication
- Language-wise distribution of cosmic rays research output
- High productivity subject areas and keyword analysis

4 Methodology

The data for this study were collected from Web of Science database, published by Thomson Reuters in the years 2004-2013, using search terms namely 'nuclear physics' in 'topic filed'. A total of 32286 records were downloaded. The data were analysed as per the objectives of the study. The analysis is based on all documents such as articles, conference proceedings papers, reviews, letters, erratum, short surveys, and book chapters are recorded in the Web of Science.

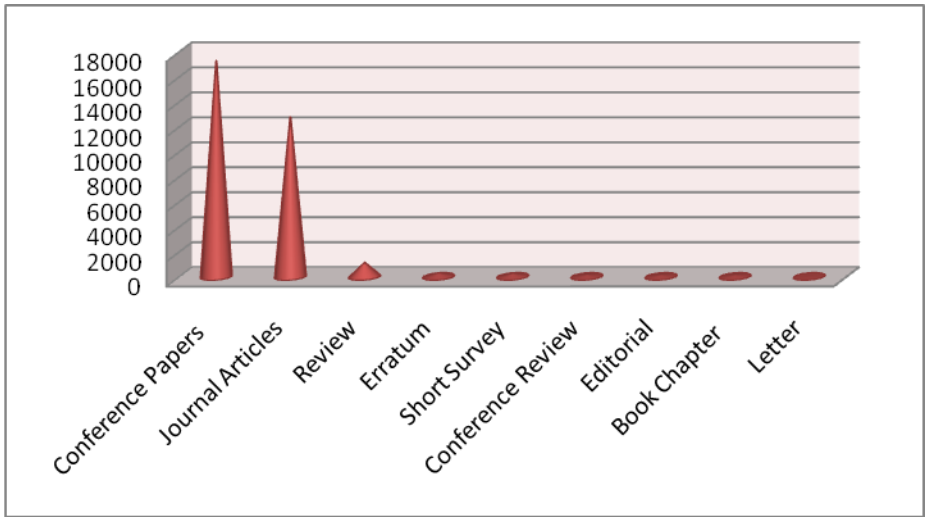
5 Data analysis and interpretations

5.1 Forms of publications

Table 1 Forms of publications

S. No.	Forms of publications	No. of publications	Percentage
1	Conference papers	17275	53.51
2	Journal articles	12781	39.59
3	Review	1139	3.53
4	Erratum	298	0.92
5	Short survey	268	0.83
6	Conference review	171	0.53
7	Editorial	160	0.49
8	Book chapter	158	0.49
9	Letter	36	0.11
Total		**32286**	**100.00**

Figure 1 Form of publications



The table 1 reveals that the major source of publications covered by web of science databases on nuclear physics research is Conference papers with 17,275 publications (53.51%) followed by Journal articles with 12,781 publications (39.59%). Review ranks the third position with 1139 publications (3.53%) and remaining forms are less than one percentage as seen in the table. The results indicate that the research outputs on the subject of the period covered by the study are mostly published in the form of conference papers.

5.2 Growth of publications

Table 2 provides the AGR and CAGR of the number of documents for period 2004 to 2013.

$$AGR = \frac{\text{End Value - First Value}}{\text{First Value}} \times 100$$

Table 2 AGR and CAGR of Publications

Year	No. of publications	Cumulative total	Annual growth rate (AGR)	CAGR
2004	1678	1678	-	-
2005	2433	4111	44.99	0.6896
2006	2683	6794	10.28	0.5913
2007	2584	9378	-3.69	0.4721
2008	3598	12976	39.24	0.3780
2009	3323	16299	-7.64	0.3744

2010	3667	19966	10.35	0.3114
2011	3279	23245	10.58	0.3154
2012	5407	28652	64.90	0.2317
2013	3634	32286	-48.79	0.2715

Figure 2 Annual growth rate of publications

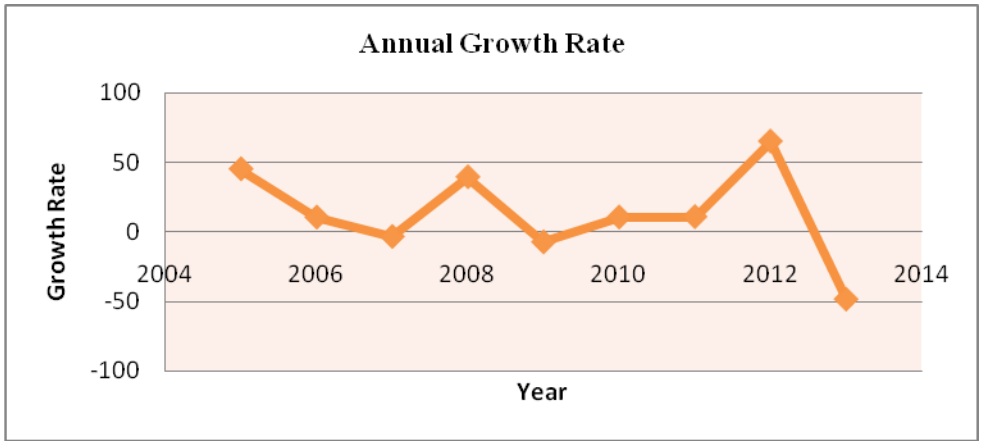


Table 2 reveals that during the period of 2004 to 2013, a total of 32,286 publications were published on nuclear physics research. The highest number of publications is 5,407 published in 2012. The lowest publications of 1,678 are published in 2004. The average number of publications published per year was 3228.6.

Table 2 also shows that the annual growth rate of the total publications calculated year wise. It is seen in the table that there is a fluctuation trend of growth in the study period. The AGR has decreased 10.28 in 2006 to -3.69 in 2007 and it was increased to 39.24 in 2008. Since then, there is fluctuation in year after year as illustrated in figure 2. The reason for the fluctuation is that there is no constant growth of publications in every year.

The compound annual growth rates of the publications are gradually decreased from 0.6896 in 2005 to 0.2715 in 2013 as seen in the Table 2. This indicates that the compound annual growth rate is in down ward trend.

5.3 Relative Growth Rate (RGR) and Doubling Time

The Relative Growth Rate (RGR) is the increase in number of articles or pages per unit of time. This definition derived from the definition of relative growth rates in the study of growth analysis in the field of mobile technology. The mean relative growth rate (R) over the specific period of interval can be calculated from the following equation.

Relative Growth Rate (RGR)

1 - 2R=Log W_2 – Log W_1/ T_2-T_1

Whereas

1-2 R- mean relative growth rate over the specific period of interval

Log_e W_1 - log of initial number of articles

Log_e W_2 - log of final number of articles after a specific period of interval

T_2-T_1- the unit difference between the initial time and the final time

The year can be taken here as the unit of time.

Doubling Time (DT) = 0.693/R

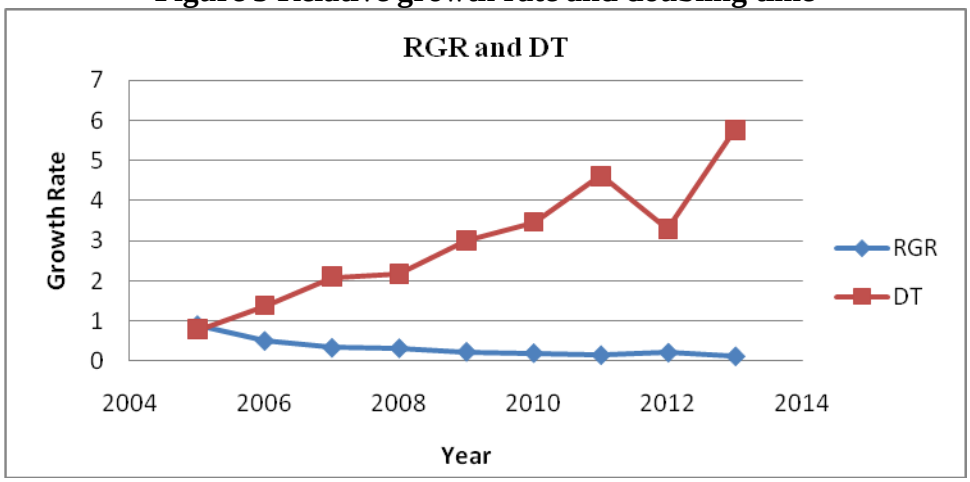
Table 3 Relative growth rate (RGR) and Doubling time (DT) of publications

Year	No. of Publications	Cumulative Total	W1	W2	RGR	DT
2004	1678	1678	-	7.43	-	-
2005	2433	4111	7.43	8.32	0.89	0.78
2006	2683	6794	8.32	8.82	0.50	1.39
2007	2584	9378	8.82	9.15	0.33	2.1
2008	3598	12976	9.15	9.47	0.32	2.17
2009	3323	16299	9.47	9.70	0.23	3.01
2010	3667	19966	9.70	9.90	0.20	3.47
2011	3279	23245	9.90	10.05	0.15	4.62
2012	5407	28652	10.05	10.26	0.21	3.3
2013	3634	32286	10.26	10.38	0.12	5.78

The year wise RGR is found to be in the range of 1 to 0.09. Year wise calculation of RGR reveals that it has decreased from 2005 to 2011 and slight increase in 2012 and thereafter the trend is seen decreasing (figure 3). The highest value corresponds to 2005, whereas the lowest value for the year 2013.

Doubling time too has a trend similar to that of RGR. Its ranges is from 0.69 to 7.7 (figure 3). A year wise increase is seen during the period of the study, the DT has shown a year wise increase from 0.78 to 4.62 and slight decrease in 3.3 and thereafter a increasing.

Figure 3 Relative growth rate and doubling time



5.4 Authorship pattern of publications

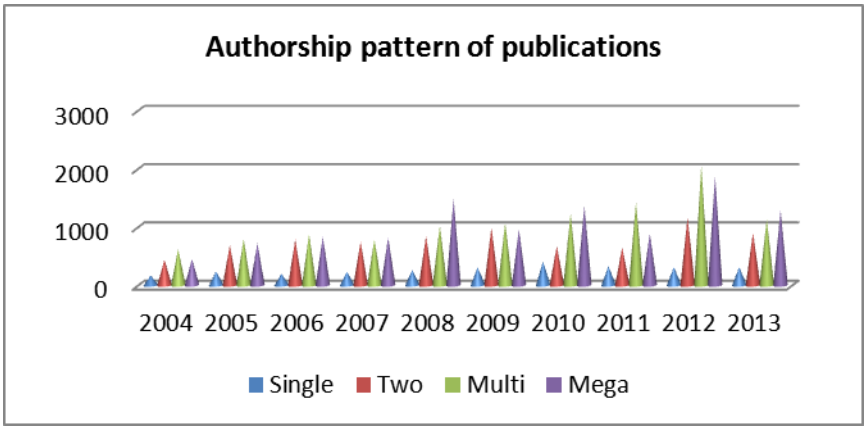
Table 4 Authorship pattern of publications

Block	Year	Single	CAI	Two	CAI	Multi	CAI	Mega	CAI	Total	CC
1	2004	169	120	438	97	619	117	452	81	1678	0.58
	2005	237	116	685	104	791	103	720	89	2433	0.58
	2006	194	86	785	109	873	103	831	94	2683	0.59
	2007	234	108	747	107	786	97	817	95	2584	0.59
	2008	259	85	843	87	1018	90	1478	124	3598	0.62
Total		**1093**		**3498**		**4087**		**4298**		**12976**	**0.59**
2	2009	307	107	987	131	1069	90	960	88	3323	0.58
	2010	408	129	669	81	1232	280	1358	112	3667	0.60
	2011	327	115	649	87	1417	121	886	82	3279	0.59
	2012	316	68	1164	95	2052	106	1875	105	5407	0.61

	2013	311	99	905	110	1134	87	1284	107	3634	0.60
Total		**1669**		**4374**		**6904**		**6363**		**19310**	**0.60**

CAI–Co -Authorship Index, CC–Collaboration Coefficient

Figure 4 - Authorship pattern of publications



The authorship pattern was analysed to determine the percentage of single and multiple authors. From the table 4 and figure 4, it is observed that out of 32286 publications, maximum of 10,991 (34.04%) publications have been contributed by multi authors, followed by mega authors with 10,661 (33.02%) publications, two authors with 7872 (24.38%) publications. Only 2762 (8.55%) publications have been contributed by single authors. It indicates that the multi authored works are more than that of single authored contributions in the field of nuclear physics.

5.5 Pattern of Co-Authorship

In order to assess the Pattern of Co-Authorship (CAI), the following formula suggested by Garg and Padhi has been employed.

$$CAI = \frac{N_{ij}/N_{io}}{N_{oj}/N_{\infty}}$$

Where,
N_{ij} = Number of papers having authors in block i
N_{io} = Total output of block i
N_{oj} = Number of papers having j authors for all blocks
N_{∞} = Total number of papers for all authors and all blocks

CAI = 100 implies that a country's co-authorship effort for a particular type of authorship corresponds to the world average, CAI > 100 reflects higher than average co-authorship effort, and CAI < 100 lower than average co-authorship effort by that country for a given type of authorship pattern.

For calculating the co-authorship index for authors, countries have been replaced by block. For this study, the authors have been classified into four blocks, vz Single, Two, Three and more than three authors and the results of Co-authorship index as per the formula have been presented in the Table 4.

For calculating the co-authorship index and collaboration coefficient for authors, countries have been replaced by block. For this study, the authors have been classified into two blocks, vz Single, Two, Multi and Mega authors and the results of Co-authorship index and collaboration coefficient have been presented in the Table 4. It reveals that the result of co authorship index and it is observed that the value of CAI for increasing and decreasing trend in the two block year periods. This implies that the collaborative pattern in nuclear physics research is mainly characterized by co-authored papers not by single authored papers.

The average value of collaboration coefficient (CC) for nuclear physics was 0.60. The highest value of CC is 0.62 in 2008 and lowest value 0.58 in 2004, 2005 and 2009. However, the value of CC is showing increasing and decreasing trend in the two blocks year periods.

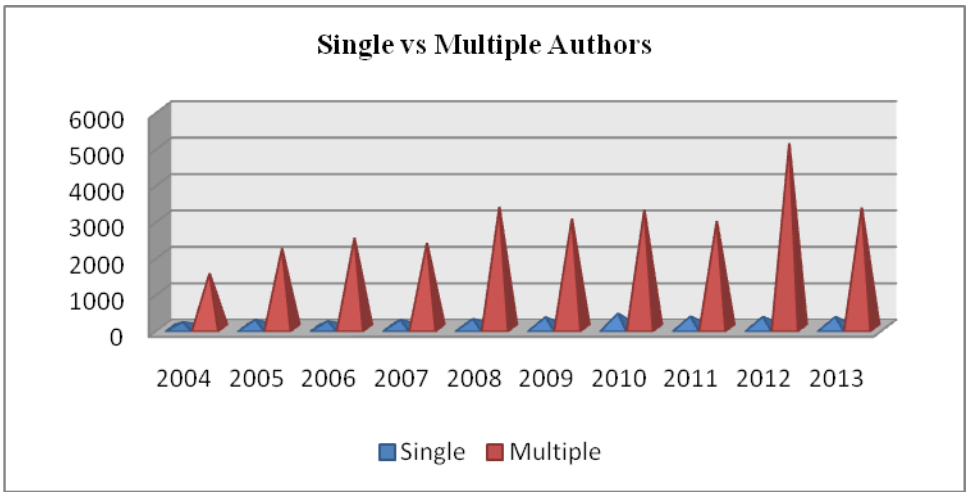
5.6 Authorship trend analysis

Table 5 Authorship trend analysis

Single authors			Multiple authors		Quantum of research output	Degree of collaboration
Year	**Quantum of output**	**Percentage**	**Quantum of output**	**Percentage**		
2004	169	0.52	1509	4.67	1678	0.90
2005	237	0.73	2196	6.80	2433	0.90
2006	194	0.60	2489	7.71	2683	0.93
2007	234	0.72	2350	7.28	2584	0.91
2008	259	0.80	3339	10.34	3598	0.93
2009	307	0.95	3016	9.34	3323	0.91
2010	408	1.26	3259	10.09	3667	0.89
2011	327	1.01	2952	9.14	3279	0.90
2012	316	0.98	5091	15.77	5407	0.94
2013	311	0.96	3323	10.29	3634	0.91

Total	**2162**	**6.70**	**30124**	**93.30**	**32286**	**0.93**

Figure 5 - Authorship Trend Analysis



The table 5 and figure 5 presents the single and multiple authors productivity pattern on yearly basis. A careful examination of the table reveals that the productivity patterns on the nuclear physics are much contributed by the multiple authors than the single author since 2004 to 2013. Thus, from this analysis it can be interpreted that basically the nuclear physics research is much dominated by multiple authors.

The Degree of Collaboration of publications of the nuclear physics is 0.93. This brings out clearly the prevalence of team research in this field. Out of the total publications 93.30% of contributions were collaborated with multi authorship and 6.70% of contributions were collaboration with single authors.

5.7 Identification of most prolific authors

Table 6 Identification of most prolific authors

Rank	Author	Institutions	No. of publications	Percentage
1	Wiescher, M	University of Notre Dame, USA	65	0.20
2	Hatanaka, K	Osaka University, Japan	62	0.19
3	Yanagida, T	Tohoku University, Japan	58	0.18
4	Takacs, S	Institute of Nuclear Physics, Hungarian Academic of Science, Hungary	55	0.17
5	Hermanne, A	Vrije Universiteit Brussel, Belgium	54	0.17

6	Levin, C S	Stanford University, USA	54	0.17
7	Heil, M	GSI Helmholtzzentrum fur Schwerionenforshung, Germany	53	0.16
8	Rauscher, T	University of Basel, Switzerland	53	0.16
8	Gramegna, F	National Institute of Nuclear Physics, Italy	53	0.16
10	Yamaya, T	Institute of Nuclear Physics, Hungarian Academic of Science, Hungary	51	0.16
11	Camera, F	Universita Degli Studi di Milano, Italy	50	0.15

Figure 6 Most prolific authors

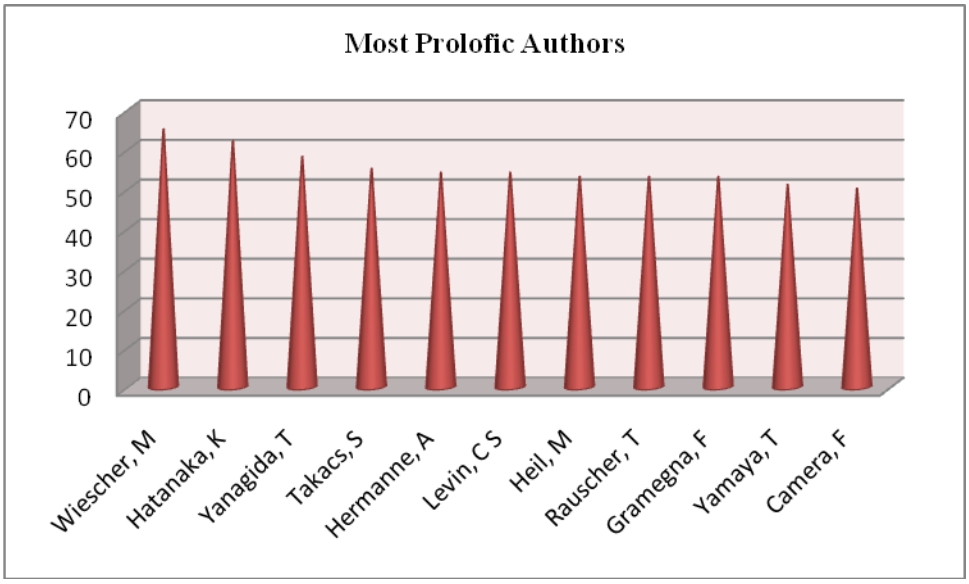


Table 6 and figure 6 presents the rank list the authors who have contributed more than 50 articles or more are taken into account to avoid a long list. It reveals that Wiescher, M, University of Notre Dame, USA is the most productive author contributing 65 articles followed by Hatanaka, K, Osaka University, Japan with 62 articles and Yanagida, T, Tohoku University, Japan with 58 articles, Takacs, S, Institute of Nuclear Physics, Hungarian Academic of Science, Hungary and Hermanne, A, Vrije Universiteit Brussel, Belgium respectively. And a total of 2629 authors are contributed entire research output of the period under study.

5.8 Highly productive institutes

Table 7 Highly productive institutes

Rank	Institutions	Country	No. of Publications
1	Istituto Nazionale Di Fisica Nucleare	Italy	1212
2	European Organization for Nuclear Research	Switzerland	979
3	Joint Institute for Nuclear Research, Dubna	Russia	536
4	Los Alamos National Laboratory	USA	506
5	University of Tokyo	Japan	505
6	GSI Helmholtz Centre for Heavy Ion Research GmbH	Germany	465
7	Oak Ridge National Laboratory	USA	448
8	Japan Atomic Energy Agency	Japan	439
9	Argonne National Laboratory	USA	412
10	Brookhaven National Laboratory	USA	409

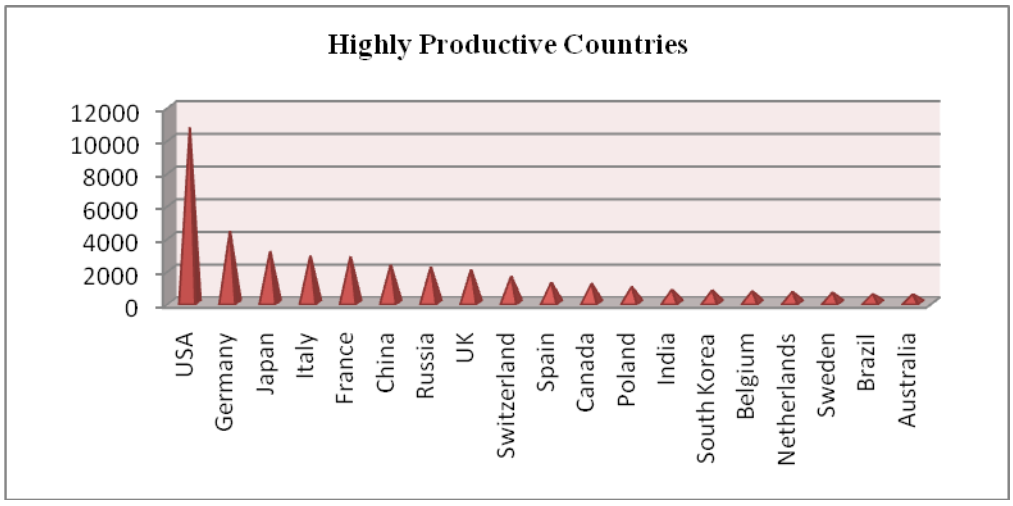
Table 7 shows the institutes that have contributed 400 or more publications on nuclear physics research during 2004-2013. Findings revealed that Istituto Nazionale Di Fisica Nucleare, Frascati, Italy with 1212 publications is the most productive institutions in the field of nuclear physics research followed by European Organization for Nuclear Research, Switzerland with 979 publications, Joint Institute for Nuclear Research, Dubna, Russia with 536 publications, Los Alamos National Laboratory, USA with 506 publications and University of Tokyo, Japan with 505 publications.

5.9 Highly productive countries

Table 8 Highly productive countries

Rank	Country	Total Publications (%)	Rank	Country	Total Publications (%)
1	USA	10734 (33.25%)	11	Canada	1191 (3.69%)
2	Germany	4403 (13.64%)	12	Poland	976 (3.02%)
3	Japan	3161 (9.79%)	13	India	808 (2.50%)
4	Italy	2889 (8.95%)	14	South Korea	766 (2.37%)
5	France	2838 (8.75%)	15	Belgium	716 (2.22%)
6	China	2328 (7.21%)	16	Netherlands	675 (2.09%)
7	Russia	2201 (6.82%)	17	Sweden	631 (1.95%)
8	UK	2031 (6.29%)	18	Brazil	538 (1.67%)
9	Switzerland	1632 (5.05%)	19	Australia	523 (1.62%)
10	Spain	1243 (3.85%)			

Figure 7 Highly productive countries



In all, there were 125 countries involved in research in nuclear physics, which published at least one publication. The USA topped the list with highest share (33.25%) of publications. Germany ranked second with 13.64% share of publications followed by Japan 9.79% share of publications, Italy with 8.95% share of publications, France with 8.75% share of publications, China with 7.21% share of publications, Russia with 6.82% share of publications, UK with 6.29% share of publications Switzerland with 5.05% share of publications and the remaining countries are publishing less than 5 % of the research output in this study period. The publication share of highly productive countries (≥500 publications) on nuclear physics is given in Table 8.

5.10 Language wise distributions

The study reveals that the maximum number of publications have been published in English language with 31696 publications (98.5%), followed by Chinese language with 159 publications (0.78%), Russian language ranks third position with 63 publications (0.31%). And the remaining languages such as French, Portuguese, Japanese and other languages are constituted in negligible percentage. The English language superiority was found in every year in total productivity on the subject during the study period.

5.11 Most preferred source titles

The conference publications and scientific journals are most important medium of communication in scientific field. To determine the most scientific journals and conference publications in this field, preferred source are identified by the researchers for their publications. Most of the source titles from USA, hence, it can be interpreted that the nuclear physics research has been dominated by the United States publishers.

Table 9 Source Title of Publications

Rank	Source Title	Country	No. of Publications	Impact Factor
1	IEEE Nuclear Science Symposium Conference Record	USA	4634	-
2	AIP Conference Proceedings	USA	3294	-
3	Journal of Physics Conference Series	UK	2301	-
4	Journal of Chemical Physics	USA	1329	2.952
5	Nuclear Instruments and Methods in Physics Research Section A Accelerators Spectrometers Detectors and Associated Equipment	Netherlands	814	1.32
6	Health Physics	USA	558	1.271
7	Nuclear Instruments and Methods in Physics Research Section B Beam Interactions with Materials and Atoms	USA	485	1.124
8	Proceedings of Science	Italy	460	-
9	Physics in Medicine and Biology	USA	443	2.761
10	Physical Review Letters	USA	418	7.512

The scientific literature on nuclear physics is spread over 2052 different source journals and conference publications. The rank list of top 10 source titles with impact factor is listed in the Table 9. It reveals that IEEE Nuclear Science Symposium Conference Record tops the list with the highest number of publications 4634 (14.35%), followed by AIP Conference Proceedings, USA with a share of 3294 (10.20%) publications. Journal of Physics Conference Series, UK occupy the third position with 2301 (7.13%) publications. The fourth highest source title is Journal of Chemical Physics, USA with 1329 (2.952%) publications and the impact factor is 2.952 and Nuclear Instruments and Methods in Physics Research Section A Accelerators Spectrometers Detectors and Associated Equipment, Netherland with 814 (2.52%) publications and the impact factor is 1.32.

5.12 High productivity subject areas

Table 10 High productivity subject areas

Rank	Subject	No. of Articles	Percentage
1	Physics and Astronomy	23413	72.52

2	Medicine	6608	20.47
3	Engineering	3158	9.78
4	Energy	2563	7.94
5	Chemistry	2358	7.30
6	Materials Science	1845	5.71
7	Computer Science	1608	4.98
8	Mathematics	1233	3.82
9	Environmental Science	897	2.78
10	Multidisciplinary	883	2.73

Table 10 shows high productivity subjects which are contributing more than 800 articles. It is observed that Physics and Astronomy has highest number of articles with 23413 followed by Medicine contributing 6608 articles. Engineering occupy the third position with 3158 articles. The fourth highest articles belonged to the subject Energy 2563 articles.

5.13 Keyword analysis

Keywords are one of the best Scientometric indicators to understand and grasp instantaneously the thought content of the publications and to find out the growth of the subject field. By Analysing the keywords appeared either in the title or assigned by the indexer or the author himself will facilitate knowing in which direction the knowledge goes.

Table 11 Keyword analysis

Rank	Subject	No. of Articles	Percentage
1	Nuclear Physics	15507	48.03
2	Medical Imaging	3780	11.71
3	High Energy Physics	2505	7.76
4	Nuclear Energy	1968	6.10
5	Fusion reactions	1818	5.63
6	Gamma Rays	1638	5.07
7	Nuclear Magnetic Resonance Spectroscopy	1588	4.92
8	Detectors	1502	4.65
9	Nuclear Magnetic resonance	1488	4.61

The keywords appeared in the Index Keywords field in web of science database of nuclear physics publications were analysed. The highly cited keywords were: Nuclear physics with

15507 (48.03%) publications, medical imaging with 3780 (11.71%) publications, high energy physics with 2505 (7.76%) publications, nuclear energy with 1968 (6.10%) publication and fusion reactions with 1818 (5.63%) publications respectively. Table 11 lists the high frequency keywords.

6 Conclusions

Nuclear physics play a very predominant role in medicine, energy, water resources, air quality, ocean circulation and global warming and archaeology and art etc. A lot of research is being carried out all over the world in this field. A total of 32286 publications were published on nuclear physics research during 2004-2013. The major source of publications covered by web of science databases on nuclear physics research is Conference papers with 17,275 publications (53.51%) followed by Journal articles with 12,781 publications (39.59%). The highest number of publications is 5,407 published in 2012. The lowest publications of 1,678 are published in 2004. The average number of publications published per year was 3228.6. The AGR has decreased 10.28 in 2006 to -3.69 in 2007 and it was increased to 39.24 in 2008. The compound annual growth rate ranges from 0.6896 was in 2005 to 0.2715 in 2013. The year wise RGR is found to be in the range of 1 to 0.09. The highest value corresponds to 2005, whereas the lowest value for the year 2013. The average value of collaborative coefficient (CC) for nuclear physics is 0.60. The highest value of CC is 0.62 in 2008 and lowest value 0.58 in 2004, 2005 and 2009. Out of 20395 publications, maximum of 9167 (44.95%) publications have been contributed by mega authors, followed by multi authors with 6135 (30.08%) publications, two authors with 3889 (19.07%) publications. Only 1204 (5.90%) publications have been contributed by single authors. Wiescher, M, University of Notre Dame, USA is the most productive author contributing 65 articles followed by Hatanaka, K, Osaka University, Japan with 62 articles and Yanagida, T, Tohoku University, Japan with 58 articles. Istituto Nazionale Di Fisica Nucleare, Frascati, Italy with 1212 publications is the most productive institutions in the field of nuclear physics research followed by European Organization for Nuclear Research, Switzerland with 979 publications. The USA topped the list with highest share (33.25%) of publications. Germany ranked second with 13.64% share of publications followed by Japan 9.79% share of publications. This trend forecast that these three countries as front runners in the coming years also. IEEE Nuclear Science Symposium Conference Record tops the list with the highest number of publications 4634 (14.35%), followed by AIP Conference Proceedings, USA with a share of 3294 (10.20%) publications.

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