



Citation Analysis of Indian Physics Research Output during 1975–2016: A Scientometric Analysis based on Web of Science

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Abstract

Introduction: Scientific journals demonstrate the quantitative approach activity, although citations indicate the research publications' quality. The research concentrates on a year-by-year analysis of citations per article, authorship patterns, citation distribution, collaboration levels and top-cited research publications in physics from Indian researchers.

Purpose: The fundamental focus of this research is to use the Web of Science database to enhance the value of physics research output of India from 1975 to 2016.

Research problem: The proposed paper uses a 42-year span to examine the citation pattern in physics research since no study has been produced that spans the full four-decade period.

Objective: Main objectives is to find out the citation distribution and authorship pattern in the field of physics by Indian contributors.

Methodology: The study was based on ISI Web of Science database to collect the relevant data concerned with numbers of articles and citation patterns in 20 sub fields of physics during 1975 to 2016, a 42-year timeframe.

Findings: The study reveals that India published 246660 papers which received 3704000 citations and average citation per paper shows upward and downward trend over the study period. The study found that 92.35% of the total publications in physics came from the group of



one to six authors. 11.70% of research papers could not receive any citation during the study period while 57 research papers have received more than 1000 citations.

Keywords: Bibliometrics, Scientometrics, Physics research output, Citation Analysis, Authorship pattern, Degree of Collaboration, Highly cited papers

Introduction:

Physics is the field of science where Indian contributions have really been outstanding in the twentieth and twentieth first century. Physics not just to promotes the advancement of technology, it also has a significant effect on the world. It is essential to comprehend the citation, which is an indication used to measure the quality of published studies, to investigate the quality of work activities in physics. So, several scientometric research have been carried out to establish academic achievement in terms of quantity and quality. For example, Rovira, et al. (2000) tried to analyze the basic research in physics in Catalonia (Spain) from 1981 to 1998 as expressed in the National Citation Report for Catalonia (Spain) developed by ISI to ascertain various criteria such as publication size, citation frequency, and citation frequency. The research authors imply how physics research in Catalonia is on the growth, specifically in the recent few years of the study period. Kim (2002) investigated at the citation trends of Korean researchers in physics and mechanical engineering to select the number of publication source and authorship choice of sources referenced by Korean scientists. Dhawan and Gupta (2007) investigated the contributions of Indian institutions and scientists in INPSEC-Physics from 1990 to 1998. They did a comprehensive examination of publishing size, communication patterns, geographical distribution, and subject-by-subject distribution, as well as explaining the many sectors responsible for publication. The study found that publication grew at a negative rate during the study period, with the majority of research publications published in low-impact journals. The top institutions during the study period were IISc, IIT Madras, and IIT Delhi. Nazim and Ahmad (2008) published a paper that looked at research trends in the field of nanotechnology and measured many factors such as publication growth, top journals, top authors, authorship pattern, top nations, and so on. According to the Web of Science database, a total of 2,675 papers were collected for [1991-06]. During the study period 1979-2008, Zheng Y N, et al. (2011) looked at the top highly cited works in physics as indexed by Web of Science. The study looked at a



variety of factors, including the distribution of highly prolific countries, institutions, authors, journals, and subjects. Using Web of Science, Bid et al. (2016) compared the status of physics research in India, Pakistan, France, and Germany using various indicators such as publication count, language, sub-domains of physics, and collaboration country pattern. Bid (2020) investigated the contribution of India and China in nuclear science technology using WoS database (2000-2019) under various parameters. According with analysis, India outperforms China in terms of average citations per paper. After 2012, China continues to grow at a rapid pace. The proposed paper uses a 42-year span to examine the citation pattern in physics research since no study has been produced that spans the full four-decade period.

Objectives:

The main objectives of the paper are

1. To explore year-wise citations obtained for Indian achievements in Physics
2. To find out citation distribution of the Indian authors
3. To discover highly cited Indian publications in the sphere of physics
4. To evaluate the structure of authorship and effective coordination

Methodology

The original study purpose was to determine India's commitment in terms of numbers of articles and citation patterns in 20 scientific fields of physics spanning 1975 to 2016, a 42-year timeframe, utilizing information collected from Clarivate Analytics' Web of Science database (WoS). The essential facts mainly correspond to the absolute number of publications published in India across the study period which were collected using general search option of Web of Science after then refined 20 sub domain of physics (like Acoustic, Astronomy and Astrophysics, Biophysics, Crystallography, Geochemistry and Geophysics, Mechanics, Nanoscience and Nanotechnology, Optics, Applied Physics, Atomic, Molecular, and Chemical Physics, Condensed Matter Physics, Fluids and Plasma Physics, Mathematical Physics, Multidisciplinary Physics, Nuclear Physics, Particles and Fields Physics, Remote Sensing, Spectroscopy, and Thermodynamics). The data are saved in data files for evaluation but instead loaded into Excel Spreadsheets for further investigation. The information gathered has been



evaluated. As qualitative measures, the frequencies of citations received by the papers that have been produced and accessible in the repository were utilized.

Data analysis and discussion

The present study has been carried out for 1975 to 2016 based on the number of cited references used by the authors of 246660 research articles. The number of references cited by scientists were examined, and a stance was discovered. Table I shows the main number of citations and the citation count per article over the last 42 years.

Table I

Year wise citation received for Indian contribution

S.No.	Year	Total no. of papers	Total sum of the citations received.	Citation/Article (Average citation per item)	h index	without self citation	Citing article	Without self citation citing
1	1975	2273	16918	7.44	46	16698	14978	14798
2	1976	2570	18093	7.04	46	17930	16516	16372
3	1977	2815	18539	6.59	44	18359	16741	16588
4	1978	3183	17968	5.64	44	17762	16141	15968
5	1979	3297	22152	6.72	49	21933	19887	19704
6	1980	3361	21202	6.31	46	20995	19099	18315
7	1981	3562	22723	6.38	52	22487	20558	20353
8	1982	3053	25498	8.35	55	25261	22982	22775
9	1983	3106	26553	8.55	55	26282	24004	23770
10	1984	3161	27888	8.82	52	27661	25759	25563
11	1985	3022	30774	10.18	56	30538	28400	28216
12	1986	3196	28492	8.91	57	28264	25793	25593
13	1987	3229	29431	9.11	60	29165	26627	26408
14	1988	3236	31997	9.89	67	31786	29098	28921
15	1989	3349	33455	9.99	61	33228	30284	30093
16	1990	3436	37843	11.01	68	37603	34492	34289



S.No.	Year	Total no. of papers	Total sum of the citations received.	Citation/Article (Average citation per item)	h index	without self citation	Citing article	Without self citation citing
17	1991	3750	41915	11.18	76	41676	38424	38215
18	1992	3783	42698	11.29	73	42411	38681	38449
19	1993	3920	49413	12.61	84	49158	44462	44244
20	1994	3883	49886	12.85	76	49599	45291	45044
21	1995	3784	54169	14.32	82	53889	48988	48743
22	1996	4268	61002	14.29	88	60698	55091	54841
23	1997	4094	59874	14.62	87	59587	54673	54432
24	1998	4141	72099	17.41	96	71752	64944	64652
25	1999	4209	71581	17.01	91	71165	64414	64087
26	2000	4120	92782	22.52	112	92294	83843	83486
27	2001	4538	89541	19.73	108	89016	80560	80149
28	2002	4875	103761	21.28	111	103136	91279	90806
29	2003	5248	135785	25.87	124	135124	119685	119215
30	2004	5727	123350	21.54	118	122713	109314	108807
31	2005	6585	139233	21.14	125	138432	120481	119867
32	2006	7504	157375	20.97	122	156204	136135	135336
33	2007	8646	169669	19.62	124	168132	146488	145494
34	2008	9345	182009	19.48	128	180560	154954	153873
35	2009	9843	181109	18.4	124	179615	153577	152436
36	2010	10781	203268	18.85	205	202413	181145	180459
37	2011	11882	207250	17.44	198	206196	182700	181876
38	2012	11894	208445	17.52	192	207411	181314	180510
39	2013	13598	222071	16.33	203	220948	193453	192526
40	2014	15323	222800	14.54	187	220586	188541	187506
41	2015	15126	185878	12.28	162	184569	160953	159920
42	2016	15944	167511	10.5	144	165381	139718	138582
Total		246660	3704000	15.01				



The overall amount of citations for each article over the last 42 years in India is shown in Table I and varies from 5.64 to 25.87 in various decades; the pattern shown in fig citation per paper demonstrates it was not recognized, fluctuates upwards and straight down. For 246660 papers of India received 3704000 citations i.e. 15.01 average citation per paper. Data also reveals that for India received minimum citation per paper in the year 1978 with 5.64 and attained the maximum in 2003 with 25.87 followed by 2000 with 22.52, 2004 with 21.54, 2002 with 21.28, 2005 with 21.14, 2006 with 20.97, 2001 with 19.73 and so on. H-index varies from 44 to 205 and it is found that H-index has its lowest value in the year 1977 and 1978 with 44 and it achieves its highest value in the year 2010 with 205 followed by 2013 with 203, 2011 with 198, 2012 with 192, 2014 with 187, 2015 with 162 and so on. Average citation per papers for the India over the study period i.e. 1975-2016 is shown in the figure 1.

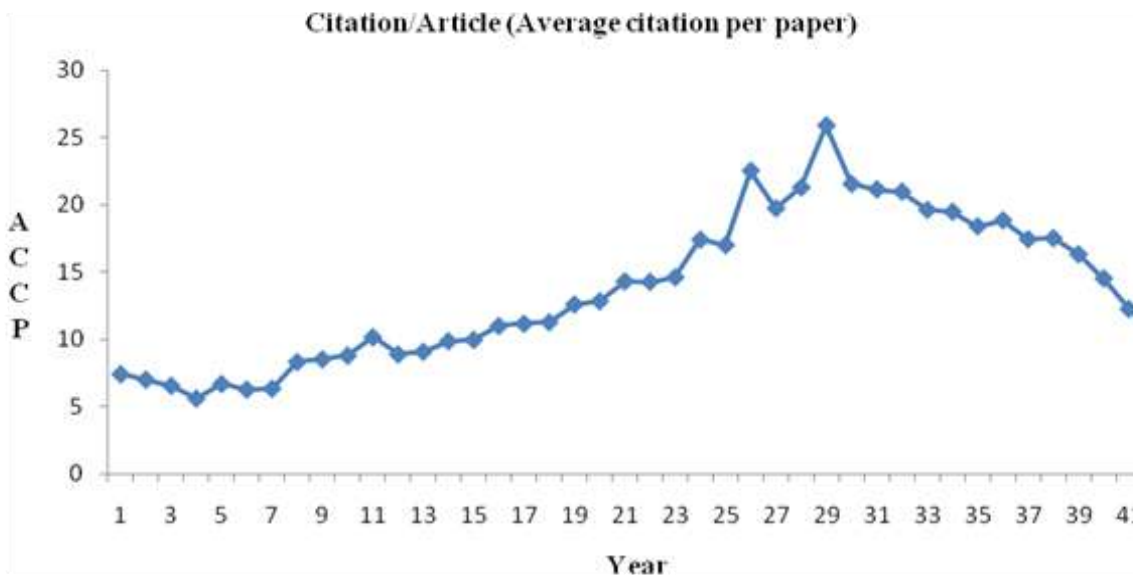


Fig. 1: ACPP for India since 1975 to 2016



Table 2

Authors distribution pattern of the Indian authors (1975-2016)

Year	One	Two	Three	Four	Five	Six	Seven	Eight	Nine	Ten	Ten>	Total	%
1975-1977	1646	3795	1671	415	87	25	7	4	1		7	7658	3.10
1978-1980	1770	4741	2338	715	175	51	20	9	5	6	11	9841	3.98
1981-1983	1531	4442	2485	840	275	89	33	9	9	1	7	9721	3.94
1984-1986	1510	4027	2413	916	283	118	43	11	15	2	41	9379	3.80
1987-1989	1435	3718	2669	1044	445	218	109	61	26	8	81	9814	3.97
1990-1992	1379	4184	2880	1392	593	253	99	70	22	8	89	10969	4.44
1993-1995	1300	4186	2923	1590	795	352	155	91	57	10	128	11587	4.69
1996-1998	1452	4103	3102	1759	911	477	218	122	69	34	256	12503	5.06
1999-2001	1401	3870	3259	1905	1034	507	273	142	78	58	340	12867	5.21
2002-2004	1459	4279	3896	2536	1586	868	434	184	125	52	431	15850	6.42
2005-2007	1584	5664	5601	3957	2695	1264	668	339	184	107	672	22735	9.21
2008-2010	1702	7243	7258	5401	3795	1753	930	518	304	176	889	29969	12.14
2011-2013	1808	8979	9212	6515	4320	2356	1291	702	405	264	1522	37374	15.15
2014-2016	1927	10942	11228	8034	5353	3096	1770	1024	645	375	1999	46393	18.80
Total	21904	74173	60935	37019	22347	11427	6050	3286	1945	1101	6473	246660	100.00
%	8.88	30.07	24.70	15.00	9.06	4.63	2.45	1.33	0.78	0.44	2.62	100.00	

The authorship pattern of Indian contributors as shown in the Table 2 where authors of India, published 246660 papers during the time period of the study and found that contributors of India preferred to publish in a group rather than solo publication. It can be seen that highest contribution by two authors (30.07%) followed by three authors (24.70%), four authors (15%), five authors (9.06%), one author (8.88%), six authors (4.63%) and more than ten authors (2.62%) and so on. This pattern also shows that authors of India published their paper within the small group as well as solo publications. 92.36% of the total publications came from the group of one to six authors. There are 423 no. of titles where the single paper is contributed by more than 500 authors, 147 numbers of titles having more than 1000 contributors and 659 numbers of titles having more than 2000 contributors. The title “Precision electroweak measurements on the Z resonance” has been contributed by 2512 authors published in Physics Reports-Review Section of Physics Letters in the year 2006,



Table 3

Citation distribution of the Indian author (1975-2016)

Times Cited	No. of papers	% of 246660
Zero Citation	28879	11.70
1	20816	8.43
2	17783	7.20
3	16339	6.62
4	13885	5.62
5	12965	5.25
6--10	44567	18.06
11--50	78382	31.77
51-100	9350	3.79
101-150	1981	0.80
151-200	751	0.30
201-250	339	0.13
251-300	186	0.07
>300	437	0.17
Total	246660	100

Table 3 shows the citation distribution of Indian authors and it reveals that 28879 papers received zero citation, 20816 papers received one citation, 17783 papers received two citations, 16339 papers received 3 citations, 13885 papers received 4 citations, 12965 papers received 5 citation, 44567 papers in citation range 6-10, 78382 papers in citation range 11-50, 9350 papers in citation range 51-100, for more than 100 citations are received by 2732 papers, more than 200 citations are received by 525 papers and more than 300 citations are received by 437 papers out of which 107 articles having citation range 500-1000, 24 papers in citation range 1001-1500, 9 papers in citation range in 1501-2000 and 24 articles having more than 2000 citations. Top 50 highly cited papers of Indian authors in different sub field of physics as shown in the Table 4.



Table 4
Top 50 highly cited papers of Indian authors

Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Agostinelli, S; Allison, J; Amako, K et al.	GEANT4-a simulation toolkit	Nuclear Instruments & Methods in Physics Research Section A- Accelerators Spectrometers Detectors and Associated Equipment	2003	506	3	250	303	11640
Chatrchyan, S.; Khachatryan, V.; Sirunyan, A. M. et al.	Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC	Physics Letters B	2012	716	1	30	61	5850
Ade, P. A. R.; Aghanim, N.; Armitage-Caplan, C. et al.	Planck 2013 results. XVI. Cosmological parameters	Astronomy & Astrophysics	2014	571				5676
Olive, K. A.; Agashe, K.; Amsler, C. et al.	Review of particle physics particle data group	Chinese Physics C	2014	38	9			5656
Ade, P. A. R.; Aghanim, N.; Arnaud, M. et al.	Planck 2015 results XIII. Cosmological parameters	Astronomy & Astrophysics	2016	594				4713
Lee, PA; Ramakrishnan, TV	Disordered electronic systems	Reviews of Modern Physics	1985	57	2	287	337	4649
Amsler, C.; Doser, M.; Antonelli, M. et al.	Review of particle physics	Physics Letters B	2008	667	1-5	1		4517



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Nakamura, K.; Hagiwara, K.; Hikasa, K. et al.	Review of particle physics	Journal Of Physics G-Nuclear and Particle Physics	2010	37	7A	1	5	4502
Abbott, B. P.; Abbott, R.; Abbott, T. D. et al.	Observation of Gravitational Waves from a Binary Black Hole Merger	Physical Review Letters	2016	116	6			4322
Patrignani, C.; Agashe, K.; Aielli, G. et al	Review of particle physics particle data group	Chinese Physics C	2016	40	10			4073
Yao, W-M; Amsler, C.; Asner, D. et al.	Review of particle physics	Journal of Physics G- Nuclear and Particle Physics	2006	33	1	1		3970
Eidelman, S; Hayes, KG; Olive, KA et al.	Review of particle physics	Physics Letters B	2004	592	1-4	1	1109	3831
Abazajian, Kevork N.; Adelman-McCarthy, Jennifer K.; Agueros, Marcel A. et al.	The seventh data release of the sloan digital sky survey	Astrophysical Journal Supplement Series	2009	182	2	543	558	3200
Copeland, Edmund J.; Sami, M.; Tsujikawa, Shinji	Dynamics of dark energy	International Journal of Modern Physics D	2006	15	11	1753	1935	3198
Groom, DE;	Review of	European Physical	2000	15	1-4	1	878	3059



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Aguilar-Benitez, M; Amsler, C et al.	Particle Physics	Journal C						
Hagiwara, K; Hikasa, K; Nakamura, K et al.	Review of particle physics	Physical Review D	2002	66	1			2940
Caso, C; Conforto, G; Gurtu, A et al.	Review of Particle Physics	European Physical Journal C	1998	3	1-4	1	+	2473
Chopra, KL; major, S; Pandya, DK	Transparent conductors - a status review	Thin Solid Films	1983	102	1	1	46	2283
Adams, J; Aggarwal, MM; Ahammed, Z et al.	Experimental and theoretical challenges in the search for the quark-gluon plasma: The STAR Collaboration's critical assessment of the evidence from RHIC collisions	Nuclear Physics A	2005	757	1-2	102	183	2174
Padmanabhan, T	Cosmological constant - the weight of the vacuum	Physics Reports-Review Section of Physics Letters	2003	380	5-6	235	320	2159
Kachru, S; Kallosh, R; Linde, A et al.	de Sitter vacua in string theory	Physical Review D	2003	68	4			2147
Robitaille, Thomas P.;	Astropy: A community	Astronomy & Astrophysics	2013	558				2129



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Tollerud, Erik J.; Greenfield, Perry et al.	Python package for astronomy							
Das, A.; Pisana, S.; Chakraborty, B. et al.	Monitoring dopants by Raman scattering in an electrochemically top-gated graphene transistor	Nature Nanotechnology	2008	3	4	210	215	2116
Kakkar, P; das, B; viswanathan, PN	A modified spectrophotometric assay of superoxide-dismutase	Indian Journal of Biochemistry & Biophysics	1984	21	2	130	132	2017
Adcox, K; Adler, SS; Afanasiev, S et al.	Formation of dense partonic matter in relativistic nucleus-nucleus collisions at RHIC: Experimental evaluation by the PHENIX Collaboration	Nuclear Physics A	2005	757	1-2	184	283	1991
Sahni, V; Starobinsky, A	The case for a positive cosmological Lambda-term	International Journal of Modern Physics D	2000	9	4	373	443	1829
Kumari, Avnesh; Yadav, Sudesh Kumar; Yadav,	Biodegradable polymeric nanoparticles based drug delivery systems	Colloids And Surfaces B- Biointerfaces	2010	75	1	1	18	1798



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Subhash C.								
Barnett, RM; Carone, CD; Groom, DE et al.	Particles and field .1. Review of particle physics	Physical Review D	1996	54	1	1	+	1778
Deb, K	An efficient constraint handling method for genetic algorithms	Computer Methods in Applied Mechanics and Engineering	2000	186	2-4	311	338	1775
Abbott, B. P.; Abbott, R.; Abbott, T. D. et al.	GW151226: Observation of Gravitational Waves from a 22-Solar-Mass Binary Black Hole Coalescence	Physical Review Letters	2016	116	24			1722
Singh, A	Digital change detection techniques using remotely-sensed data	International Journal of Remote Sensing	1989	10	6	989	1003	1633
Gorini, V; kossakowski, A; sudarshan, ECG	Completely positive dynamical semigroups of n-level systems	Journal Of Mathematical Physics	1976	17	5	821	825	1552
Agarwal, Avinash Kumar	Biofuels (alcohols and biodiesel) applications as fuels for internal combustion engines	Progress in Energy and Combustion Science	2007	33	3	233	271	1519
Das, SK; Putra, N; Thiesen, P et	Temperature dependence of thermal	Journal of Heat Transfer-Transactions of The	2003	125	4	567	574	1475



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
al.	conductivity enhancement for nanofluids	Asme						
Ade, P. A. R.; Aghanim, N.; Armitage-Caplan, C. et al.	Planck 2013 results. XXII. Constraints on inflation	Astronomy & Astrophysics	2014	571				1399
Polkovnikov, Anatoli; Sengupta, Krishnendu; Silva, Alessandro et al.	Colloquium: Nonequilibrium dynamics of closed interacting quantum systems	Reviews Of Modern Physics	2011	83	3	863	883	1323
Simon, R	Peres-Horodecki separability criterion for continuous variable systems	Physical Review Letters	2000	84	12	2726	2729	1280
Peng, Juan; Gao, Wei; Gupta, Bipin Kumar et al.	Graphene Quantum Dots Derived from Carbon Fibers	Nano Letters	2012	12	2	844	849	1277
Marchetti, M. C.; Joanny, J. F.; Ramaswamy, S. et al.	Hydrodynamics of soft active matter	Reviews Of Modern Physics	2013	85	3			1265
Eisenstein, Daniel J.; Weinberg, David H.; Agol, Eric et al.	SDSS-III: massive spectroscopic surveys of the distant universe, the milky way, and extra-solar planetary systems	Astronomical Journal	2011	142	3			1188



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Miller, RE; Shenoy, VB	Size-dependent elastic properties of nanosized structural elements	Nanotechnology	2000	11	3	139	147	1150
Sastry, G. Madhavi; Adzhigirey, Matvey; Day, Tyler et al.	Protein and ligand preparation: parameters, protocols, and influence on virtual screening enrichments	Journal Of Computer-Aided Molecular Design	2013	27	3	221	234	1150
Mahajan, S; Tuteja, N	Cold, salinity and drought stresses: An overview	Archives Of Biochemistry and Biophysics	2005	444	2	139	158	1148
Choi, SK; Olsen, SL; Abe, K et al.	Observation of a narrow charmoniumlike state in exclusive $B_{u,s} \rightarrow K_{u,s} \pi^+ \pi^- J/\psi$ decays	Physical Review Letters	2003	91	26			1119
Kumar, S. Girish; Devi, L. Gomathi	Review on Modified TiO ₂ Photocatalysis under UV/Visible Light: Selected Results and Related Mechanisms on Interfacial Charge Carrier Transfer Dynamics	Journal Of Physical Chemistry A	2011	115	46	13211	13241	1097
Abachi, S; Abbott, B;	Observation of the top-quark	Physical Review Letters	1995	74	14	2632	2637	1088



Authors	Title	Source Title	Year	Vol	Issue	Beginning Page	Ending Page	Total Citations
Abolins, M et Al.								
Panchokarla, L. S.; Subrahmanya m, K. S.; Saha, S. K. et al.	Synthesis, Structure, and Properties of Boron- and Nitrogen-Doped Graphene	Advanced Materials	2009	21	46	4726		1087
Murphy, CJ; Jana, NR	Controlling the aspect ratio of inorganic nanorods and nanowires	Advanced Materials	2002	14	1	80	82	1076
Abashian, A; Abe, K; Abe, R et al.	The Belle detector	Nuclear Instruments & Methods In Physics Research Section A- Accelerators Spectrometers Detectors And Associated Equipment	2002	479	1	117	232	1073
Gerard, M; Chaubey, A; Malhotra, BD	Application of conducting polymers to biosensors	Biosensors & Bioelectronics	2002	17	5	345	359	1067

Degree of Collaboration (DC):

Table 5

Degree of Collaboration Measures

	Number of publication	Nm+N _s	DC
Total number of Single/Multi- Authored Publications	246660		
Number of Co-Authored Publication (NM)	224756	246660	0.91



Number of Single-Authored Publication (NS)	21904		
Number of two-Authored Publication	74173	96077	0.77
Number of three-Authored Publication	60935	82839	0.73
Number of Four-Authored Publication	37019	58923	0.62
Number of Five-Authored Publication	22347	44251	0.5
Number of Six-Authored Publication	11427	33331	0.34
Number of Seven-Authored Publication	6050	27954	0.21
Number of Eight-Authored Publication	3286	25190	0.13
Number of Nine-Authored Publication	1945	23849	0.08
Number of Ten Authored Publication	1101	23005	0.04
Number of Eleven and above-Authored Publication	6473	28377	0.22

For finding the degree of collaboration (DC) of India and China, Subramanyam (1983) formula

has been used i.e. $DC = \frac{Nm}{Nm + Ns}$

Where Nm = Number of multi-authored papers

Ns = Number of single authored papers

Calculation: DC for two authored publications for India

$$Nm = 74173 \& Ns = 21904$$

$$DC = 74173 / (74173 + 21904) = 0.77$$

The lowest value of DC for India has been found among ten authored publications (0.04) and highest found among two authors (0.77) followed by three authored publications (0.73), four authored publications (0.62), five authored (0.5), six authored publications (0.34) and so on.

Conclusion:

This paper mainly highlights the qualitative analysis of India's contribution in the field of physics for the period of four decades (1975-2016) i.e. 42 years as indexed in web of Science database. The study reflected that India contributed 246660 papers which received 3704000 citations i.e. 15.01 average citation per paper and average citation per articles also not in steady rate rather, it shows upward and downward trend over the study period. It was found that India



achieved highest average citation per articles in the year 2003 with 25.87 and minimum in the year 1978 with 5.64. The authorship pattern suggested that of contributors from India preferred to publish their paper within a small group as well as solo publications and the majority of research papers had been published by two authors (30.07%) followed by three authors (24.70%), four authors (15%), five authors (9.05%), one author (8.88%), six authors (4.63%) and so on. The publications came from the group of one to six authors contributed 92.35% of the total publication in physics from India and there were 147 numbers of titles had more than 1000 contributors and 659 numbers of titles had more than 2000 contributors. The study also revealed that 11.70% of research papers could not receive any citation during the study period and there were 57 research papers which had received more than 1000 citations while the title “GEANT4-a simulation toolkit” received highest citation with 11640 which was published in “Nuclear Instruments & Methods In Physics Research Section A-Accelerators Spectrometers Detectors And Associated Equipment” in the year 2003.

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