Summer 5-12-2020

Quality Assessment of Nuclear physics journals by comparing bibliometrics indicators

Md.safiqur rahaman
Research Assistant, Deanship of Library affairs, King Fahd University of Petroleum and Minerals, Dhahran, KSA, mdsafiqur@kfupm.edu.sa

Khadeeja M.N Ansari
College of Design, College of Design, P.O. 1982, Imam Abdulrahman Bin Faisal University, Dammam, KSA, kmnansari@iau.edu.sa

Shakil Ahmad
Deanship of Library Affairs, New Central Library, P.O. 1982, Imam Abdulrahman Bin Faisal University, Kingdom of Saudi Arabia, shahmad@iau.edu.sa

Dr. Hashem Hussein Al-Attas
Deanship of Library affairs, King Fahd University of Petroleum and Minerals, Dhahran, KSA, hattas@kfupm.edu.sa

Rahman Md Rafiqur
Research Scholar, Department of Library and Information Science, Shri Jagdishprasad Jhabarmal Tibrewala University, Rajisthan, India, rafiqurrahman982@gmail.com

Quality Assessment of Nuclear physics journals by comparing bibliometrics indicators

Md. Safiqur Rahaman
Research Assistant, Deanship of Library affairs,
King Fahd University of Petroleum and Minerals, Dhahran, KSA
mdsafiqur@kfupm.edu.sa
ORCID: 0000-0003-1367-2618

Khadeeja M. N. Ansari
Lecturer, College of Design,
College of Design, P.O. 1982, Imam Abdulrahman Bin Faisal University, Dammam, KSA
kmnasari@iau.edu.sa
ORCID: 0000-0002-1451-3822

Shakil Ahmad
Lecturer and Technical Librarian, Deanship of Library Affairs, New Central Library, P.O. 1982, Imam Abdulrahman Bin Faisal University, Kingdom of Saudi Arabia.
E-mail: shahmad@uod.edu.sa; shakilahma@ gmail.com

Dr. Hashem Hussein Al-Attas
Manager, Deanship of Library affairs,
King Fahd University of Petroleum and Minerals, Dhahran, KSA
hattas@kfupm.edu.sa

Md Rafiqur Rahman

Research Scholar, Department of Library and Information Science, Shri Jagdishprasad Jhabarmal Tibrewala University, Rajisthan., India

E-mail-rafiqurrahman982@gmail.com

Abstract:
Purpose: The present study aimed to assess and review the quality of journals from the field of nuclear physics based on some selected high-quality bibliometrics indicators, namely Journal Impact Factor (JIF), Eigenfactor Score (ES), SCImago Journal Rank (SJR) and H5-index.
Methodology: Nineteen (19) nuclear physics journals from the Web of science core collection and Scopus database have been retrieved and tabulated under each mentioned indicator as per the ranks and values for the analysis. The analysis has done by using IBM SPSS (21.0).
Findings: Bivariate correlation coefficient have been considered, a high Pearson's (r) observed between JIF and SJR (r = 0.957) while the lowest observed between JIF and ES (r = 0.033). Spearman's rank correlation coefficient (ρ) found very high between JIF and SJR (ρ =0.963) and very low between JIF and ES (ρ = 0.281). Thus, JIF and SJR show a strong correlation with each other.

Limitation: The journals considered for assessment only from the field of nuclear physics indexed in Web of science core collection, hence only 19 journals have found for the evaluation.
Originality/Value: This study will be helpful for the researchers and academicians from nuclear physics, looking for highly cited quality journals to publish their scientific research paper, as well as for the librarians/information scientists looking for high-quality collection development.

Keywords: *Journal Impact Factor, Eigenfactor Score, SCImago Journal rank, H5, Journal rank indicator, nuclear physics Journals, Bibliometrics.*

Paper type: Research Paper

Introduction:

Citations generally considered as a performance indicator of research, most cited (referred) article reflects the impact of research or research quality. Journal citation indicators always play a remarkable role in the assessment of journals. These indicators are trending, to use individually or in comparison with each other, to evaluate the quality of journals. All these indicators deal with measuring different aspects of performance like impact factor, research productivity, and the prestige (Roldan-Valadez *et al.*, 2019). Recently, researchers refer to journal citation metrics when looking for appropriate journals to submit their research for accreditations outcomes, citation aspect, and acknowledgment of research conducted (Ahmad *et al.*, 2018). Miller proclaimed that the journal ought to be estimated by how well it serves researchers, the uprightness of its audit and production procedure, and how it adds to the base

of information through high-quality publications. (Miller,2015). Quality of research journals generally measured through different bibliometric tools, and all these indicators have their own merits and demerits. For the present study, bibliometric tools such as Journal Impact Factors (JIF), Eigenfactor Score (ES), SCImago Journal Ranking (SJR), and H5 Index have been considered for the assessments of nineteen (19) nuclear physics journals retrieved from Web of science.

The JIF (originated from the SCI and published by Clarivate Analytics) is the widely used Scientometric tool, developed the Eugen Garfield in 1955. JIF considered as citation measures and the main criteria for evaluating scientific journals (Cantín, Muñoz and Roa, 2015). It defined as the ratio of the number of all citable documents published in the two preceding years to all citable items published in the same period (Ramin and Shirazi, 2012).

$$JIF_{(2018)} = \frac{Citation\ received\ in\ (2016+2017)}{Item\ published\ in\ (2016+2017)}$$

Besides its popularity and acceptance around the world, JIF has also criticized by the absence of value appraisal of citations, the impact of self-references and English language predisposition, etc. (Sadeghi, 2014).

Eigenfactor Score is a new bibliometrics indicator designed in 2007, which uses a similar algorithm like Google's PageRank and considering Web of Science indexed journal for quality standards (Wikipedia contributors, 2020). The indicator ES is reliable and prestigious because of its strong mathematical background, which ignores self-citation (Karanatsiou, Misirlis and Vlachopoulou, 2017). For calculating Eigenfactor Score, an iterative method is often used by other prestigious citation sources and time windows for ES based on five years of citations (Sadeghi, 2014).

$$ES = \frac{Influence\ of\ the\ citing\ journal}{Total\ no.of\ citations\ appearing\ in\ that\ journal}$$

(Carl Bergstrom and Jevin West, 2007)

SCImago Journal Rank (SJR) is another indicator (similar to ES) that developed in 2007. It uses Scopus indexed journal for quality assessment, which applies the algorithm of PageRank on the Scopus database for three years (Ramin and Shirazi, 2012).

$$SJR = \frac{Average\ no.of\ weighted\ citations\ receieved\ in\ a\ year}{No.\ of\ documents\ published\ in\ previous\ three\ years}$$

Google Scholar H5 index based on five years publication window (Google Scholar, 2020). This innovation of Google metric development of Journal ranking has attracted the interest of authors, writers, and researchers.

H5-Index = H5 index is the H-index for articles distributed over the most recent five years (Moed, 2017)

Bibliometric indicators:

Table 1: Bibliometric indicators

Indicators	Publishers	Source Database	Website
Journal Impact Factor (JIF)	Clarivate Analytics	Web of Science	www.webofknowledge.com
Eigenfactor Score (ES)	Eigenfactor.org	Web of Science	www.eigenfactor.org www.webofknowledge.com
SCImago Journal Ranking (SJR)	SCImago	Scopus	www.Scopus.com www.SCImago.com
H5- Index	Google	Google Scholar	www.scholar.google.com

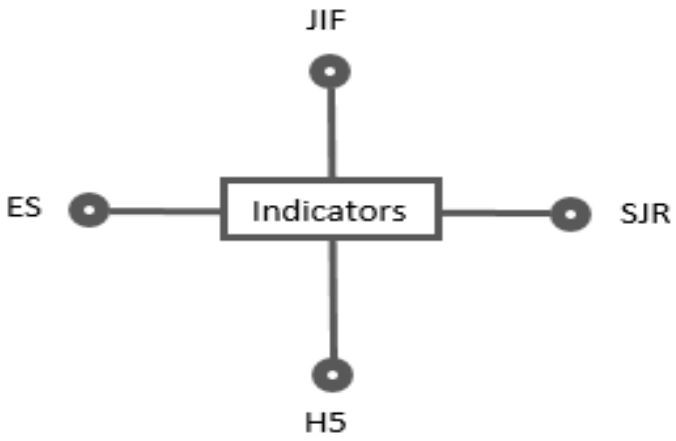


Fig 1: Bibliometric indicators

Objectives of the Study:

The primary objective of the present study is to compare and analyze the quality measurement components of nuclear physics journals as related to universally accepted quality ranking indicators namely JIF, ES, SJR and H5 index and to ascertain the possibility

to use ES, SJR and H5 as an alternative indicator to JIF for the assessment of nuclear physics journals.

Scope and Limitations:

This research paper evaluates the quality of journals in the field of nuclear physics. This evaluation will provide exposure to the subject scholar, researchers, and academicians of the same area to publish their scientific paper and to keep abreast of new research trends in the field since all the journals indexed in Scopus and Web of science. Also, this study helpful for the librarian/information scientist for high-quality collection development.

The limitation of this study is that the selected journals for the assessment have retrieved from the Web of science core collection and Scopus database; therefore, only nineteen (19) journals found to evaluate.

Method and Materials:

Journals from the field of nuclear physics have chosen to analyze. A total of 19 Journals from Web of science core collection have retrieved. The listed journals of nuclear physics also indexed in the Scopus database. The JIFs and ESs of 2018 obtained from the Journal citation report of Web of Science. SJRs and H5 derived from the Scopus database and Google metrics, respectively. All the 19 journals then arranged and tabulated under each mentioned indicator concerning their ranks and values metrics to calculate and compare statistically. The bivariate correlation coefficient between the parameters of each indicator derived. Values calculated with Pearson's correlation coefficient and for ranks Spearman's correlation coefficient calculated. Top ten journals have identified and represented by bump charts. Scatterplots for each indicator concerning their ranks and values have made, and correlation represents by linear trend line or fit line. For the calculation, a Statistical Package for Social Sciences (SPSS) 21.0, version 2012, used. Microsoft Access version 2010 and Microsoft Excel 2010 used for the visual representation of analysis in the form of bump charts and scatter plots.

Result and Discussion:

The ranking of all 19 journals of Nuclear physics has compared and matched with selected four metrics (JIF, ES, SJR, and H5) of 2018. All the selected journals of nuclear physics have good quality and standards since they are indexed in the reputed database of Web of Science and Scopus, and have high visibility among the researcher of nuclear physics journals.

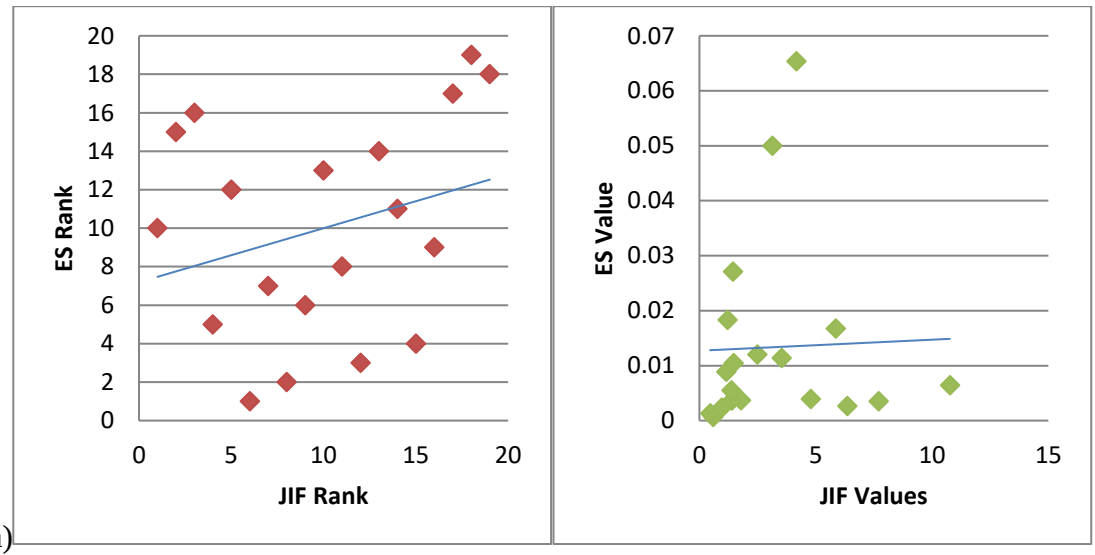
➢ *Bivariate correlation:*

To evaluate the metrics, the bivariate correlations coefficient, i.e., Pearson's correlation (r) and Spearman's rank correlation (ρ), have been considered (refer table no. 3). Strong Pearson's (r) value observed between JIF and SJR (r = 0.957) followed by JIF with H5 (r = 0.213) while the weakest value found between JIF and ES (r = 0.033). Spearman's ranks correlation coefficient (ρ) observed higher between JIF and SJR (ρ =0.963) followed by JIF and H5 (ρ = 0.378) and lower between JIF and ES (ρ = 0.281). (Refer table 2).

Table 2: Bivariate correlation between four indicators for ranking of nuclear physics journals

Correlation statistic	**Coefficient Values**	**Significant.**
Pearson's r between JIF and ES values	0.033	0.895
Pearson's r between JIF and SJR values	0.957	0.000
Pearson's r between JIF and H5 Values	0.213	0.381
Spearman's rho between JIF and ES rankings	0.281	0.244
Spearman's rho between JIF and SJR rankings	0.963	0.000
Spearman's rho between JIF and H5 rankings	0.378	0.110

a)



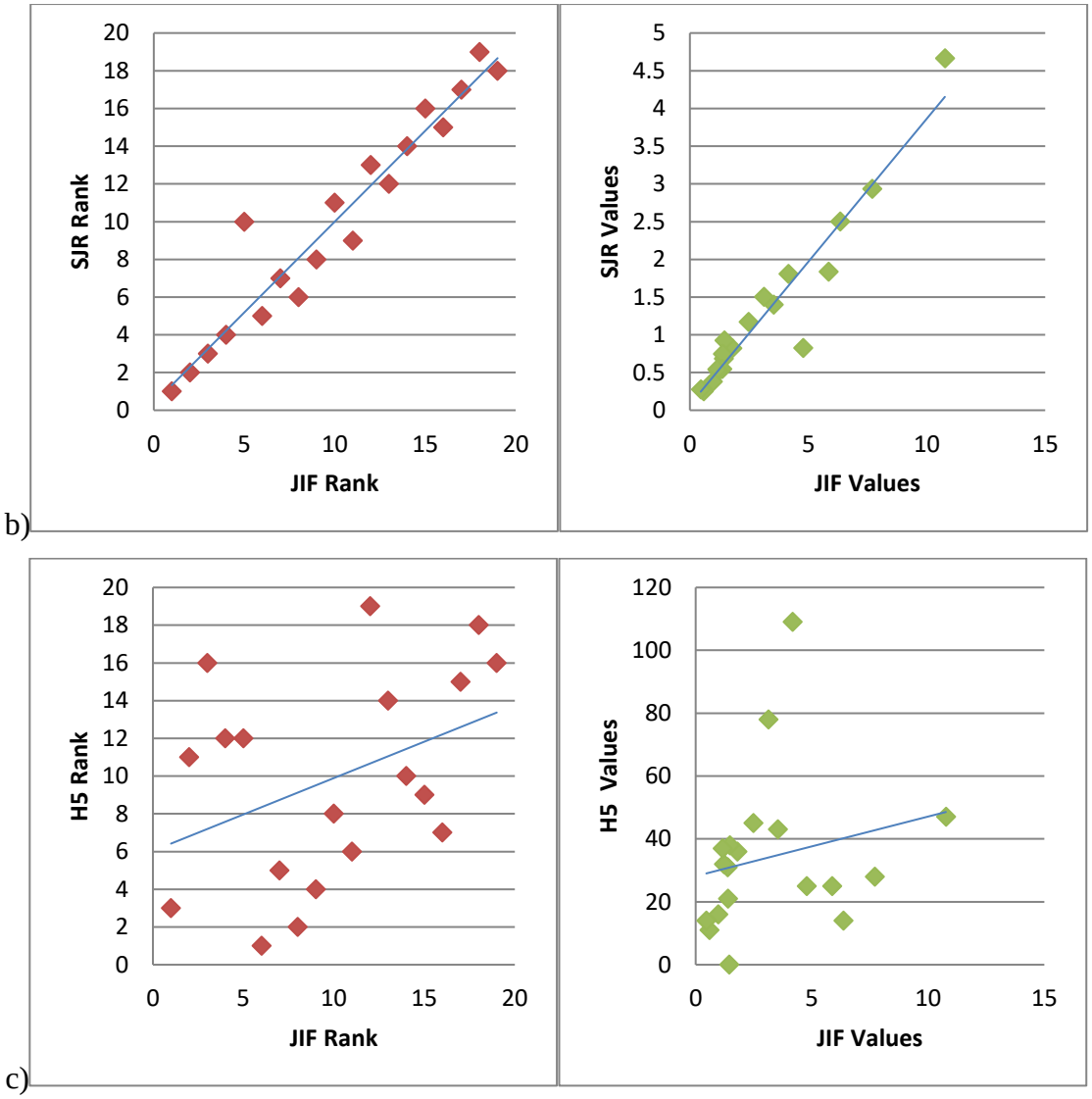


Fig 2: Scatter plots showing the correlation between indicators JIF with ES, SJR, and H5 (values and ranking) for 19 Nuclear physics journals.

As per above figure 4, the direct correlation between the indicators (JIF, ES, SJR, and H5) as well as their linear trend line observed. According to fig 4, a) JIF with SJR showing a direct relationship in terms of values and ranks. While fig b) JIF with ES doesn't show clear linear relation since there are remarkable differences in the values and ranks between the indicators; therefore, it will intimate inconvenience in the assessment of journals. Fig 4 c) shows the relation between JIF with H5 is merely linear.

- *Comparative Analysis between Journal Impact Factors, Eigenfactor Score, SCImago Journal Ranking, and H5 Index of Nuclear Physics Journals:*

I. Values and ranks: Table 3 shows there are noticeable variations in the ranking of journals with different indicators under consideration. The values of the indicator also exhibit remarkable fluctuations compare to each other. JIF values for 19 nuclear physics journals ranging from 10.764 to 0.458, ES values ranging from 0.00641 to 0.00127, SJR value ranges from 4.667 to 0.277, and H5 values ranging from 47 to 14.

H5= 47-14,

JIF =10.764-0.458,

SJR= 4.667-0.222

ES= 0.00641-0.00127

∴For nuclear physics,

Indicator value = H5 ≥ JIF ≥ SJR ≥ ES

II. Top three journals: As per table 3, the top journals for each indicator observed as follows. In case of JIF, the top three most-cited journals are Progress in Particle and Nuclear Physics (10.764), Annual Review of Nuclear and Particle Science (7.7) and Atomic Data and Nuclear Data Tables (6.349) respectively; while the lowest citation recorded by the Physics of Atomic Nuclei (0.458).

As per Eigenfactor Score, the top three (3) ranked journals are Physics Letters B (0.06535), Physical Review C (0.04996), and "Nuclear Instruments & Methods in Physics Research Section A-Accelerators Spectrometers Detectors and Associated Equipment" (0.02708). In contrast, the lowest ES ranked have recorded for Physics of Atomic Nuclei (0.00127) and Nukleonika (0.00066).

As per SJR indicators, top three (3) journal has similarly ranked with JIF namely Progress in Particle and Nuclear Physics (4.667), Annual Review of Nuclear and Particle Science (2.933) and Atomic Data and Nuclear Data Tables (2.504), in contrast, the lowest-ranked received by Nukleonika (0.25).

The indicator H5 indexed revealed the top three (3) journals as Physics Letters B (109), Physical Review C (78), and Progress in Particle and Nuclear Physics (47) while lower score recorded by Nukleonika (11). It has also found that "Nuclear Instruments & Methods in Physics Research Section A-Accelerators Spectrometers Detectors and Associated Equipment "(0) didn't index in the Google metrics. (Refer table 3).

Table 3: Comparative Analysis between Journal Impact Factors, Eigenfactor Score, SCImago Journal Ranking and H5 Index of Nuclear Physics Journals

Journal Title	JIF Value	JIF Rank	E Value	ES Rank	SJR Value	SJR Rank	H5 Value	H5 Rank
Progress in Particle and Nuclear Physics	10.764	1	0.00641	10	4.667	1	47	3
Annual Review if Nuclear and Particle Science	7.7	2	0.0035	15	2.933	2	28	11
Atomic Data and Nuclear Data Tables	6.349	3	0.00264	16	2.504	3	14	16
Chinese Physics C	5.861	4	0.01673	5	1.837	4	25	12
Nuclear Data Sheets	4.778	5	0.00393	12	0.824	10	25	12
Physics Letters B	4.162	6	0.06535	1	1.806	5	109	1
Journal of Physics G-Nuclear and Particle Physics	3.534	7	0.01138	7	1.401	7	43	5
Physical Review C	3.132	8	0.04996	2	1.502	6	78	2
European Physical Journal A	2.481	9	0.01204	6	1.172	8	45	4
Physical Review Accelerators and Beams	1.788	10	0.0037	13	0.823	11	36	8
Nuclear Physics A	1.463	11	0.01041	8	0.926	9	38	6
Nuclear Instruments & Methods in Physics Research Section A-Accelerators Spectrometers Detectors and Associated Equipment	1.433	12	0.02708	3	0.686	13	0	19
International Journal of Modern Physics E	1.386	13	0.00365	14	0.746	12	21	14
Modern Physics Letters A	1.367	14	0.0055	11	0.546	14	31	10
Nuclear Instruments & Methods in Physics Research Section B-Beam Interactions With Materials and Atoms	1.21	15	0.01828	4	0.518	16	32	9
International Journal of Modern Physics A	1.153	16	0.00887	9	0.542	15	37	7
Nuclear Science and Techniques	0.961	17	0.00233	17	0.381	17	16	15
Nukleonika	0.585	18	0.00066	19	0.25	19	11	18
Physics of Atomic Nuclei	0.458	19	0.00127	18	0.277	18	14	16

- *Top Ten JIF ranked Nuclear physics journals in comparison with ES, SJR and H5-Index ranking:*

The top ten journals selected from JIF and compared with each indicator, such as ES, SJR, and H5, respectively, then represented by bump charts for better visualization of differences.

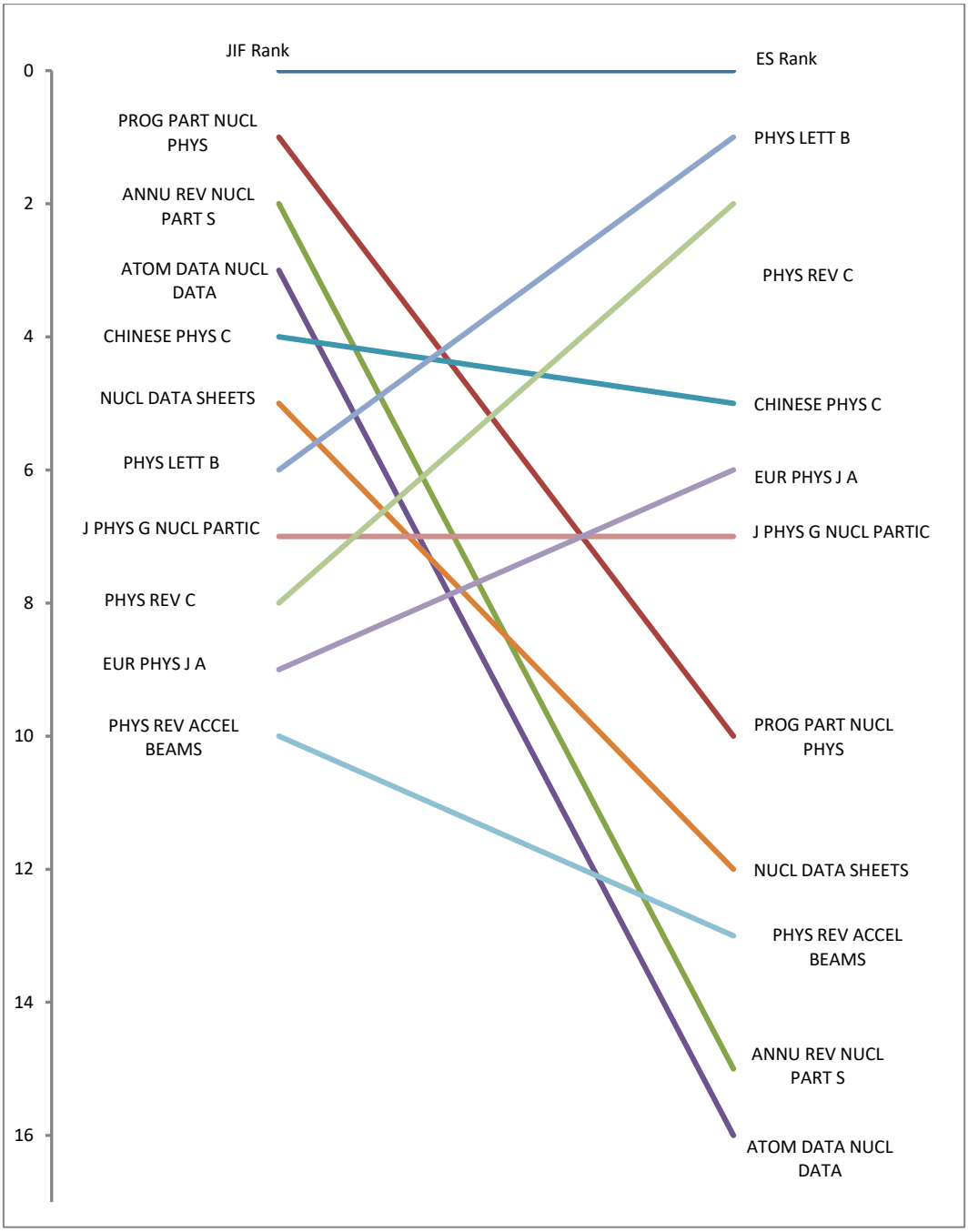


Fig 3: Bump chart for top 10 JIF ranked journals in comparison with ES ranking.

Fig (2) shows a bump chart for the top ten JIF ranked nuclear physics journals in comparison with ES ranking. It reveals that there is a fluctuating range of rank between JIF and ES indicators for nuclear physics journals.

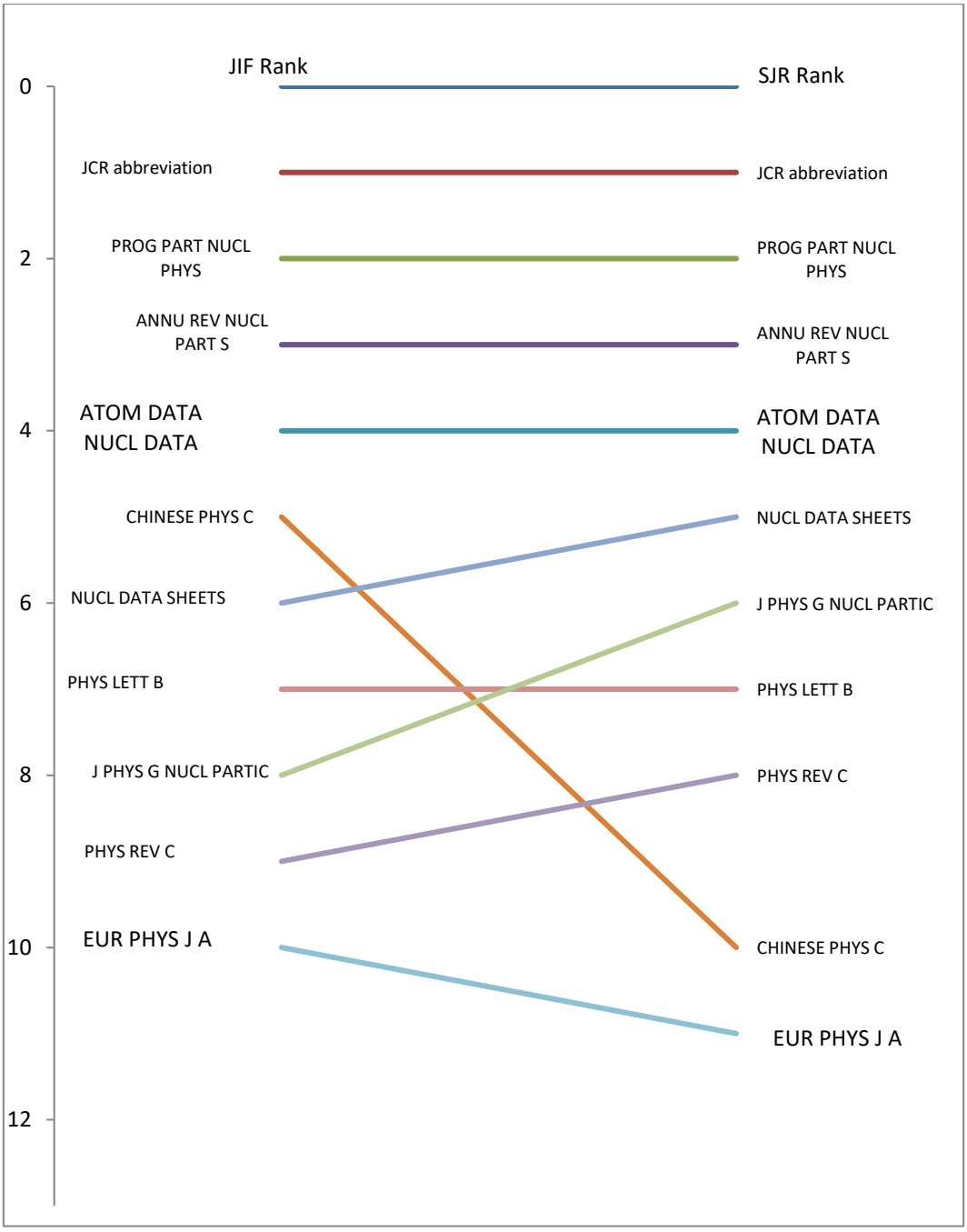


Fig 4: Bump chart for top 10 JIF ranked journals in comparison with SJR ranking.

Fig (3) Depicts a Bump chart for the top 10 JIF ranked Nuclear physics journals in comparison with SJR ranking. The figure clearly shows that there is a good correlation between journal indices except for the Journal of Chinese Phys C, which shows little fluctuation between two indices.

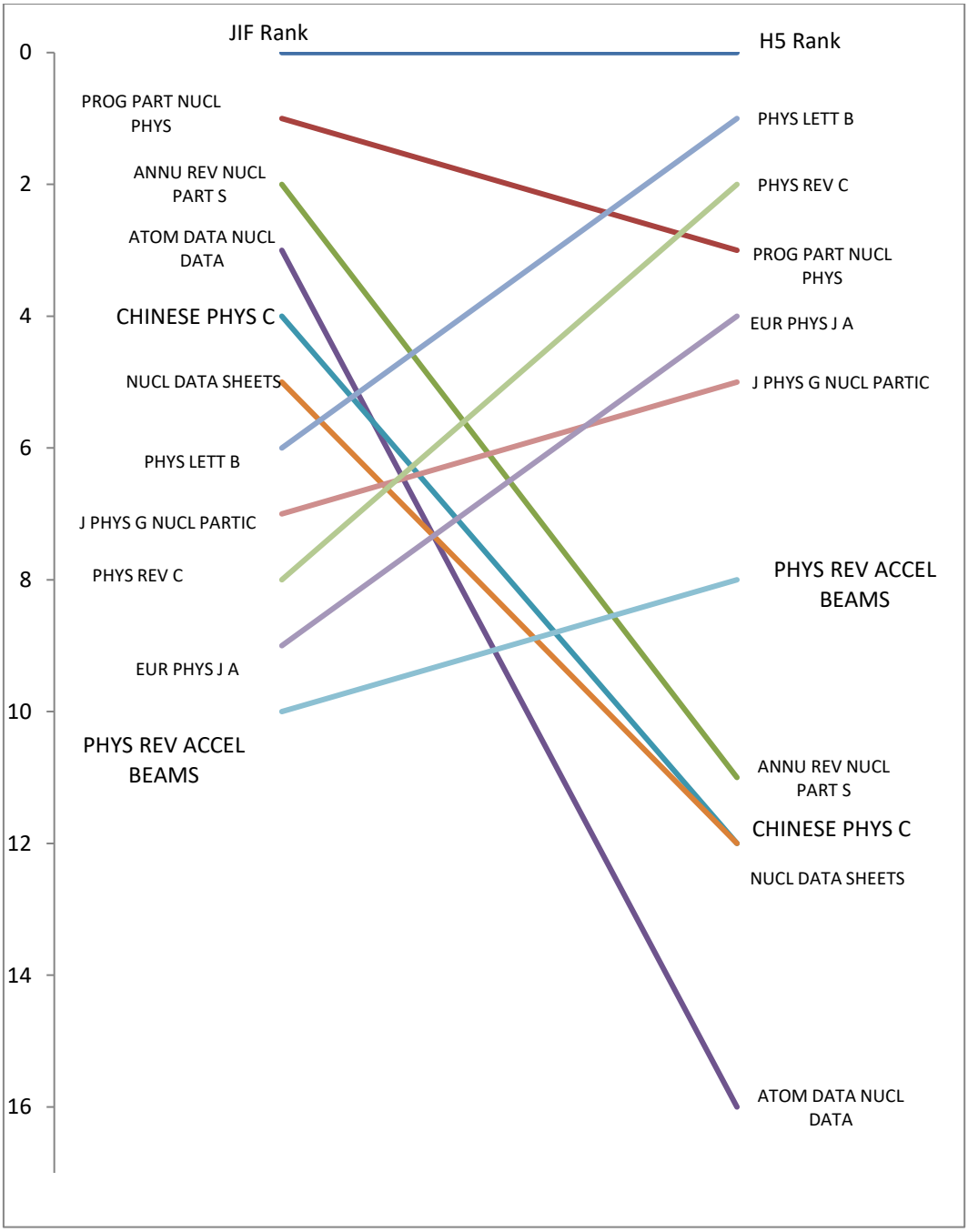


Fig 5: Bump chart for top 10 JIF ranked journals in comparison with H5 Index ranking.

Fig (4) Demonstrated a Bump chart for the top 10 JIF ranked Nuclear physics journals in comparison with H5 Index ranking. The described that there is scattered and fluctuated rank between the indicators of nuclear physics journals. The rank of "Atom Data Nucl Data" continuously deterioration in the index of h5 as compared to JIF.

a

Conclusion: To sum up, for this study, the journal impact factor (JIF) have considered as the primary indicator to compare with other international standard indicators such as Eigenfactor Score (ES), SCImago Journal Ranking (SJR) and H5 index for the quality assessments of nuclear physics journals. The indicator JIF vs. indicator SJR and indicator JIF vs. indicator H5 Index show a strong correlation with each other in terms of metric of ranking and values. Therefore, the researchers and academicians from the subject discipline of nuclear physics can consult SJR and H5 index as an alternative to JIF to assess the journals of their discipline to publish their scientific researches.

Reference:

Ahmad, S. *et al.* (2018) 'SCImago, eigenfactor score, and H5 index journal rank indicator: A study of journals in the area of construction and building technologies', *DESIDOC Journal of Library and Information Technology*, 38(4), pp. 278–285. doi: 10.14429/djlit.38.4.11503.

Cantín, M., Muñoz, M. and Roa, I. (2015) 'Comparison between Impact Factor, Eigenfactor Score, and SCImago Journal Rank Indicator in Anatomy and Morphology Journals', *International Journal of Morphology*, 33(3), pp. 1183–1188. doi: 10.4067/s0717-95022015000300060.

Carl Bergstrom and Jevin West (2007) *eigenfactor.org, eigenfactor.org*. Available at: http://eigenfactor.org/about.php (Accessed: 13 April 2020).

Google Scholar (2020) *Google Schoolar, Google Schoolar metricsolar metrics*. Available at: https://scholar.google.com/citations?view_op=top_venues&hl=en (Accessed: 4 April 2020).

Karanatsiou, D., Misirlis, N. and Vlachopoulou, M. (2017) 'Bibliometrics and altmetrics literature review: Performance indicators and comparison analysis', *Performance Measurement and Metrics*, 18(1), pp. 16–27. doi: 10.1108/PMM-08-2016-0036.

Miller, G. W. (2015) 'Toxicological Sciences: Measuring the true impact of the journal', *Toxicological Sciences*, 147(1), pp. 2–4. doi: 10.1093/toxsci/kfv157.

Moed, H. F. (2017) *Applied Evaluative Informetrics, Applied Evaluative Informetrics*.

Ramin, S. and Shirazi, A. S. (2012) 'Comparison between impact factor, SCImago journal rank indicator and eigenfactor score of nuclear medicine journals', *Nuclear Medicine Review*, 15(2), pp. 132–136.

Roldan-Valadez, E. *et al.* (2019) 'Current concepts on bibliometrics: a brief review about impact factor, Eigenfactor score, CiteScore, SCImago Journal Rank, Source-Normalised Impact per Paper, H-index, and alternative metrics', *Irish Journal of Medical Science*. Irish Journal of Medical Science (1971 -), 188(3), pp. 939–951. doi: 10.1007/s11845-018-1936-5.

Sadeghi, R. (2014) ‘Comparison between impact factor, eigenfactor metrics, and SCimago journal rank indicator of pediatric neurology journals’, *Acta Informatica Medica,* 22(2), pp. 103–106. doi: 10.5455/aim.2014.22.103-106.
Wikipedia contributors (2020) *Eigenfactor*, *In Wikipedia, The Free Encyclopedia*.