Nuclear Physics Authorship Trends

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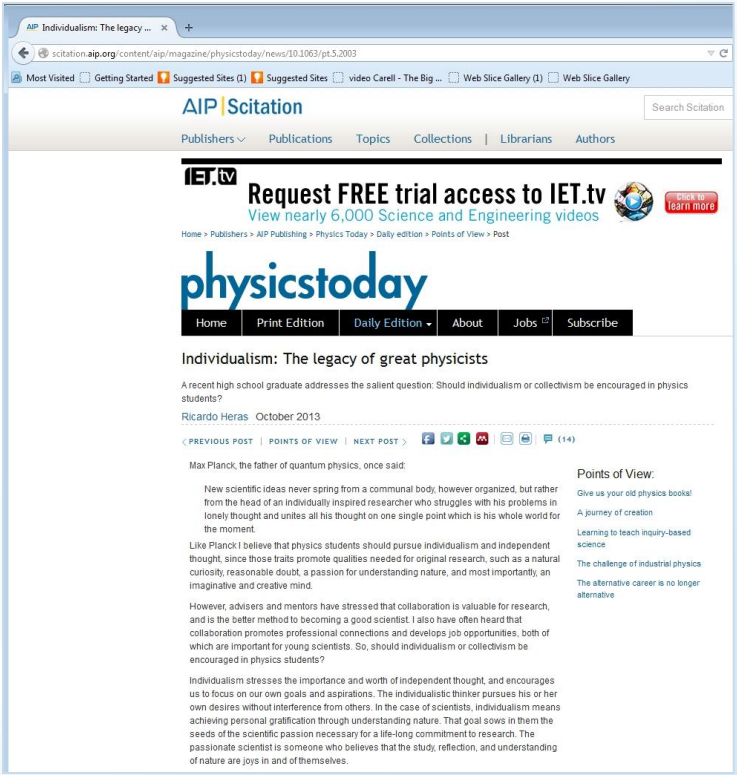
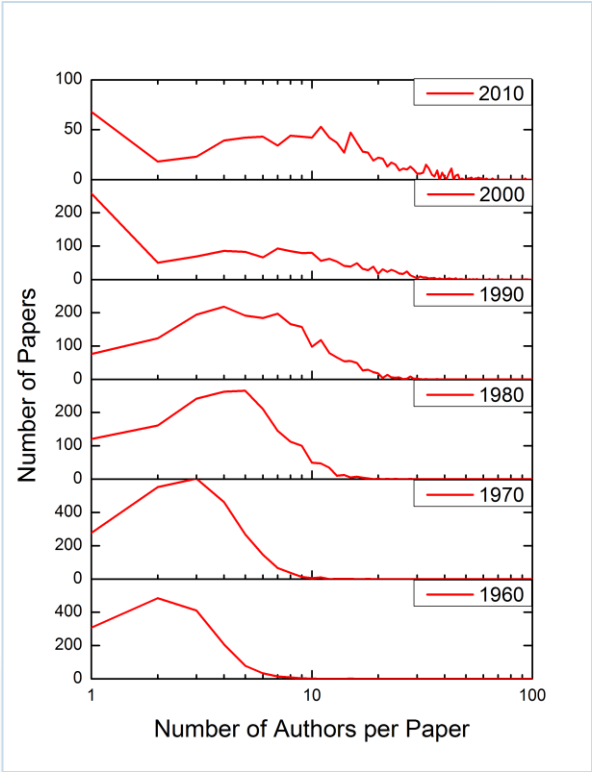
Physics Today

- P.J. Wyatt, ``Too many authors, too few creators," Physics Today: April 2012, 65 Issue 4, 9.
- Authors comment on authorship commentary, Physics Today: August 2012, 65 Issue 8, 8-11.
- Maximum number of authors in NSR was increased from 128 to 256 one year ago.
- R. Heras, ``Individualism: The legacy of great physicists," Physics Today: October 2013, http://scitation.aip.org/content/aip/magazine/physicstoday/news/10.1063/pt.5.2003.
- Is it a whole story???



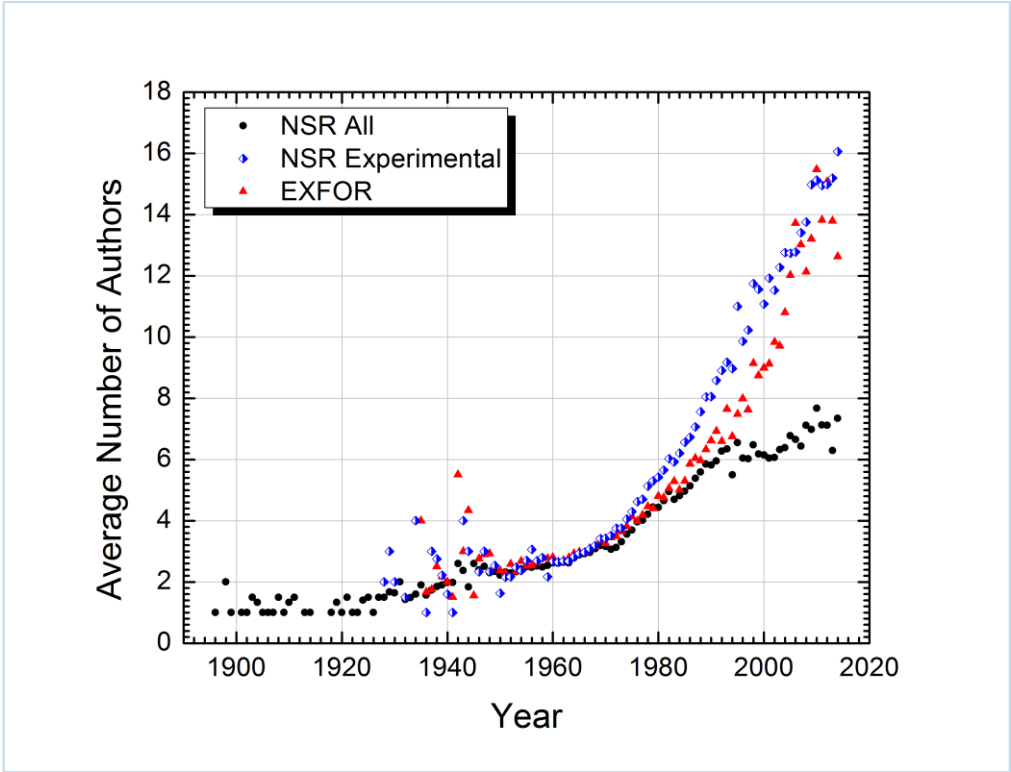
Nuclear Science References Database

- P.J. Wyatt and others have analyzed small samples.
- NSR DB is a statistically-significant sample:
  - 215,000 articles
  - 92,600 authors
  - Timeline: 1896 to present
- In the early years, these data experience fluctuations due to insufficient number of publications, and become very reliable in the 50ies.
- Initial analysis of NSR Authorship evolution supports findings of P.J. Wyatt.



NSR & EXFOR Authors

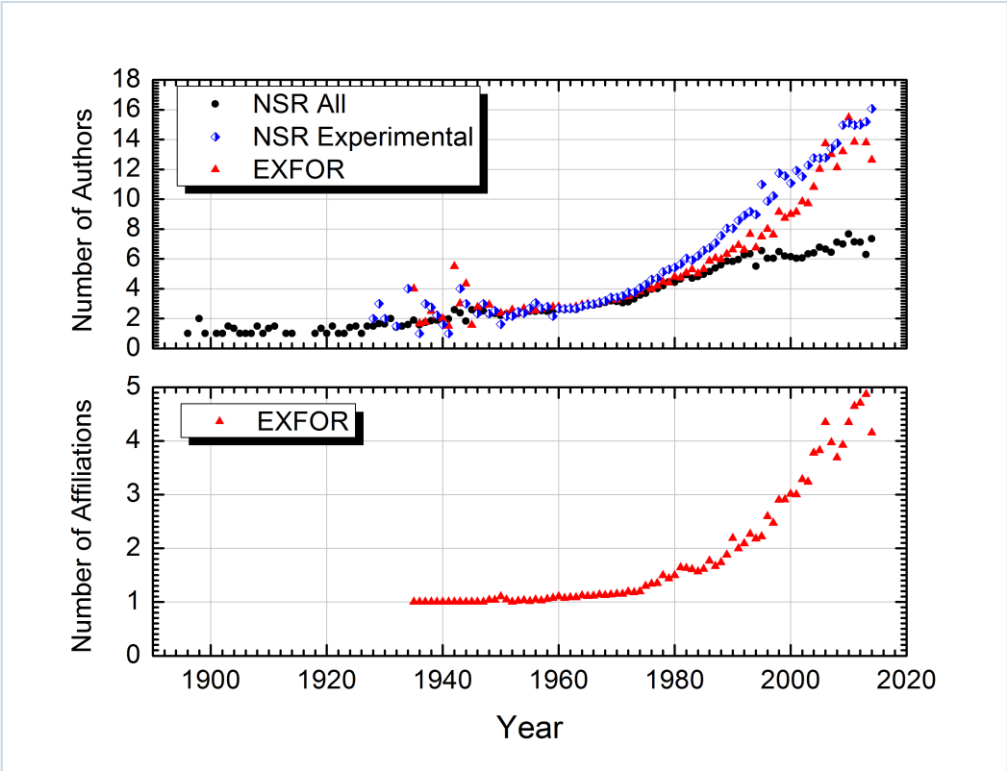
- Annual trends of:
  - NSR Authors
  - NSR Experimental papers
  - EXFOR authors
- Increase ~1990
- Possible explanation:
  - The end of the ``Cold War"???
  - Information Age Revolution (Internet effect)???



Internet Effect

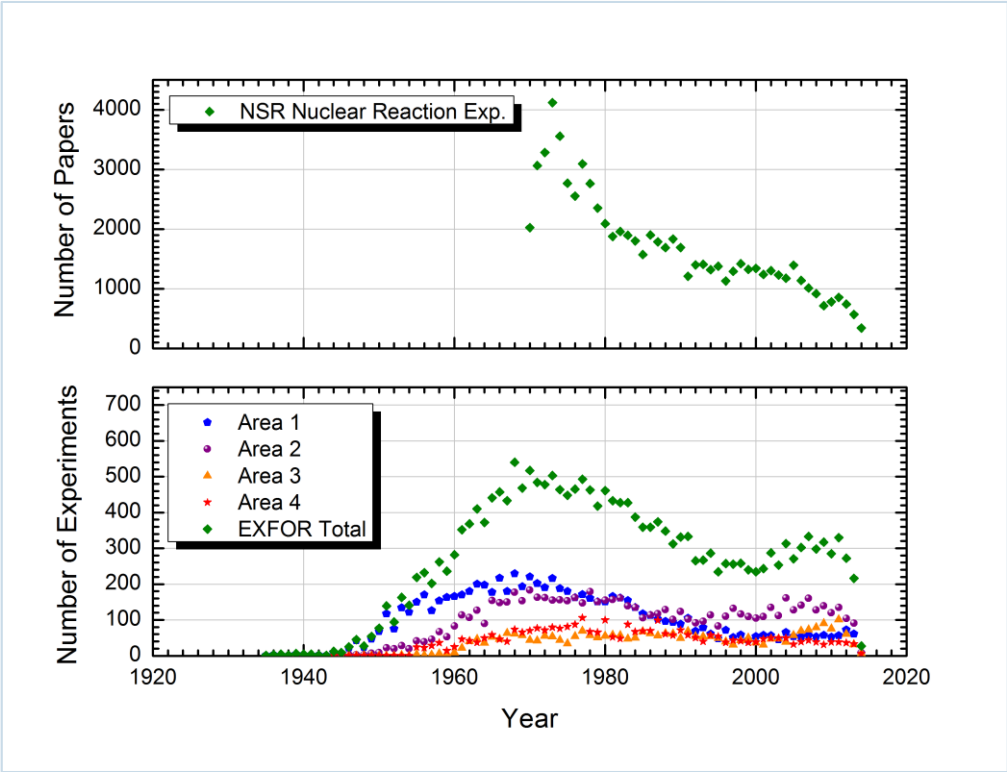
- Collaborative style of research between different institutions.
- EXFOR database tracks authors' affiliations.
- Number of affiliations correlates with authors.
- Average number of affiliations is equal to

  2 in 1990 and 3 in 2000.
- Internet facilitates information exchange between physicists.



Experimental Nuclear Reaction Papers & Experiments

- Authors/Affiliations are going up while papers are down…
- EXFOR tracks a number of experiments in Area 1 (US & Canada), Area 2 (Europe), Area 3 (Africa, Asia, Latin America), Area 4 (Former USSR & Russian Federation) by grouping all relevant publications in to a single entry.



Evolution of Research

- The nature of research has changed in 90ies due to closures and conversions of a large number of small facilities: Chalk River, Indiana, ORELA,...
- Smaller number of the more advanced facilities produces less papers.
- More sophisticated experiments that often require large teams.
- Relatively constant level of research staff and graduate students over the years.
- More lenient authorship rules, in the past important contributions were often listed in the acknowledgements.
- Information age revolution that made world-wide collaborations possible.
- Finally, authorship increase or ``inflation of author list".

Conclusions

- Results of the NSR and EXFOR bibliographical data mining have been presented.
- The data analysis shows a strong correlation between authorship increase of experimental papers and overall reduction of measurements due to closures of many small facilities.
- The increase of the group sizes coincide in time with the development of Web collaboration tools.
- These findings suggest that **article authorship is a very complex phenomenon**, and presently-observed increase or “inflation” in authorship could be explained by the **adaption to the changing research environment, in addition to the evolving authorship rules** that progressed over the years from very strict to lenient.
- An additional research is necessary to investigate these new trends in other areas of science.

Other Interesting Trends

- The largest number of articles per single scientist in NSR is 1017, and 100 out of 92600 authors have at least 330 publications.
- Such a large number of publications per single contributor could not be possible previously, when users operated a large number of small facilities.
- The overall number of nuclear reaction experiments in the area 1 is 37.16%, area 2 is 34.79%, area 3 is 13.35% and area 4 is 14.70% of the total.
- Additional funding is necessary to sustain scientific output in Area 1.
- The described above trends reflect a non-uniform distribution of nuclear science activities around the world.
- Data analysis was performed in September of 2014.