

Scientometric Portrait of Nobel Laureate Anthony J. Leggett

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Introduction

The Royal Swedish Academy of Sciences has awarded to Anthony J Leggett as one of the three recipients of the Nobel Prize (2003) in Physics for pioneering contributions to the theory of superconductors and superfluids. Now a days individual scientists including the Nobel laureates, are becoming the focus of scientometric studies. A few scientometric studies on Nobel laureates have been conducted. (Cawkell & Garfield, 1980; Koganuramath, Angadi, Kademan, Kalyane, & Jange, 2004; Kademan, Kalyane, Vijai Kumar, & Lalit Mohan, 2005). Nobel prize is regarded as the most honorific recognition of scientific achievement. The prestige of Nobel Prize is so great that it enhances the standing of nations and institutions as well as reputation of its “laureates”

Objectives

Anthony J Leggett was taken as a case study for present scientometric analysis while highlighting his domain-wise contributions; domain-wise authorships; prominent collaborators; use of channels of communications, and documentation of keywords from titles of the papers. The main concept of working on individual scientists especially on Nobel laureates is to provide an example of ‘Role Model Scientist’ for the younger generation to emulate and create scientific temper among them.

Materials and Methods

Present study is limited to the 194 papers by A J Leggett (1964-2004). The bibliographic fields were analysed by normal count procedure. Full credit was given to each author regardless of whether

he happens to be the first author or the last author.

Similarly one score was allotted to subject, journal, and keyword etc.

Results and Discussion

Domain-wise Contributions

Leggett had contributed 65 papers in the domains; Superfluid 3He (1964 – 2004), followed by 36 papers in Foundations of Quantum Mechanics (1968 – 2003), 24 papers in Dissipative Quantum Systems (1965 – 1994), 18 papers in Atomic Alkali Gases (1979 – 2003), and fifty one papers in Miscellaneous (1966 – 2004).

Collaborator-ship

Anthony J Leggett had 122 single – authored (62.88%) papers in various domains such as Superfluid 3He (45), Foundations of Quantum Mechanics (28), Miscellaneous (25), Dissipative Quantum Systems (13) and Atomic Alkali Gases (11). Year - wise collaboration trend of Anthony J Leggett is shown in Figure 1.

To measure the collaborative research pattern, a simple indicator called Collaboration Coefficient (number of collaborative papers divided by total number of papers) is used. Highest collaboration coefficient (1.00) for Anthony J Leggett was found in 1964, 1971 and 1983. Researchers and their authorships in collaboration with A J Leggett in chronological order of their association (starting with first paper publication year) are depicted in Figure 2.

The Productivity Coefficient was 0.60, which clearly indicates that Leggett’s productivity increased after 50percentile age. He had highest number of collaborative papers (6) in 1985 and published

highest (10) number of papers in 1987, 1994 and 1998. He did not publish any paper in the year 1967.

Domain-wise Authorships

The research group of A J Leggett had the credits as number of authorships in various domains: Superfluid 3He (91), Foundations of quantum mechanics (49), Dissipative quantum systems (40), Atomic Alkali gases,(28), and Miscellaneous (117).

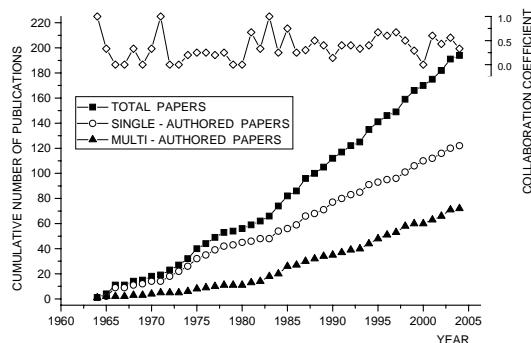


Figure 1: Growth Pattern of Single-authored and Multi-authored Papers and Collaboration Coefficient of Papers of A J Leggett

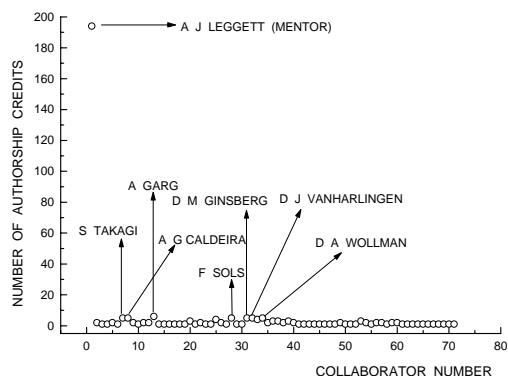


Figure 2: Authorship Credits to Collaborators with A J Leggett

Prominent Collaborators

Most active researchers having number of publications with Anthony J Leggett were : Garg (6); Caldeira (5); Ginsberg (5); Vanharlingen (5); Sols (5); Takagi (5); Wollman (5). Two scientists had collaboration in four papers each were: Yu, C C and Lee, W C. Five scientists had collaboration in 3 papers each. Sixteen scientists had collaboration in two papers each. Forty scientists could collaborate in only one paper each. Total number of authors in the research group was 71 and total number of authorships was 325.

Use of Channels of Communication

Distribution of Anthony J Leggett's 194 publications were spread over 139 journal articles, 26 conference papers, 26 edited books and 3 translations. He has

published 42 papers in *Phys. Rev. Lett.* (1965–2000), 9 papers in *Phys. Rev. B* (1981–2003), 8 papers in *J. Low Temp. Phys.* (1970–2002), 7 papers in *Phys. Rev. A* (1965–2003), 6 papers each in *Ann. Phys.* (1968–1983) and *Foundations of Physics* (1988–2003), 5 papers each in *J. Phys.* (1970–2001), *Prog. Theor. Phys.* (1966–1980), and *Rev. Mod. Phys.* (1975–2003).

Distribution of A J Leggett's Publications in Different Types of Communication Channels

It is clear from the study that his 71.65 percentage of publications were published in scientific journals with high impact factors followed by 28.35 percentage of publications in conferences, books, translations etc.

Keyword Tomography

'Keywords' are one of the best indicators to understand and to grasp instantaneously the thought content of the papers, methodologies used and areas of research addressed to. Frequently used keywords in the titles of the papers were: Quantum mechanics (16); New phases (13); Quantum tunneling (8); Cuprate superconductivity (7); Macroscopic level (6); Superfluidity (6); and Liquid 3He (5).

Conclusions

A J Leggett has published 194 papers during 1964–2004. He published his first paper in 1964 when he was 26 years of age. The percentage of collaborative work (37.12) of the scientist was found to be low although he had as many as 71 collaborators whom he guided as a mentor. The percentage of single authorship papers (62.88) was found to be very high. His papers have been scattered in 140 high impact factor scientific journals. It will be very interesting if one attempts to study the sociological aspects and citation studies on A J Leggett which may give many new insights into his scientific career. Nobel laureates are an altogether different kind of intellectual geniuses highly dedicated to unravel the mysteries of nature. Studying the lives of Nobel laureates and documenting systematically the varied experiences may help to inspire the younger generation.

References

- Cawkell, T. & Garfield, E. (1980). Assessing Einstein's impact on today's science by citation analysis. In: M. Goldsmith, A. Mackay & J. Woudhuysen (Eds). *Einstein: The first hundred years* (31–40). Oxford: Pergamon.
- Kademani, B. S., Kalyane, V. L., Vijai Kumar, & Lalit Mohan. (2005). Nobel laureates: Their publication productivity, collaboration and authorship status. *Scientometrics*, Vol. 62: 261–268.
- Koganuramath, M. M., Angadi, M., Kademani, B. S., Kalyane, V.L. & Jange, S. (2004). Physics Nobel Laureate Wolfgang Ketterle: A scientometric portrait. *Malaysian Journal of Library & Information Science*, 9(2): 35-62