

Pieter Zeeman Chair in Amsterdam and C. V. Raman's Dutch connections

Rajinder Singh and Falk Riess

The correspondence between Raman and the Dutch scientists Pieter Zeeman and Jacob Clay shows that Raman was invited to take over the Zeeman Chair at the University of Amsterdam. However in the end he did not receive this prestigious position. The reasons for this are discussed.

There are a number of biographies¹⁻⁶ about C. V. Raman, who in 1930 brought the Nobel Prize in Physics to the 'East side of the Suez' and also brought Indian science to the international scene. Though different aspects of his life have been elaborated, his contacts with Dutch scientists and an invitation for the Zeeman Chair are almost unknown.

After a brief background and a short biography of P. Zeeman, a description of his contacts with Raman and the issue of the Zeeman Chair will be discussed in this article.

Life and times of Raman

Raman lived in Calcutta for 25 years, where he started his career as a young scientist, founded an Indian School of Physics and won the Nobel Prize. That was the 'Golden Period' of his life. Due to his popularity, he was offered the directorship of the Indian Institute of Science (IISc). Soon after his arrival administrative controversies broke out, the details of which have been given by Venkataraman⁷ and Subbarayappa⁸.

Raman had been humiliated. He would have preferred to leave the Institute if he had got the chance. In fact such a chance came in his life. He was asked to take the Zeeman Chair at the University of Amsterdam. Before we give the details, it will be appropriate to give a short biography of Pieter Zeeman and his contacts with Raman.

Pieter Zeeman (1865-1943)

The extracted biographical data of Zeeman's life are taken from well-known references^{9,10}. Zeeman who together with H. A. Lorentz (1853-1928) was awarded the Nobel Prize in 1902, is known for the discovery of the Zeeman effect. It deals with the splitting of spectral lines in

magnetic fields and was later recognized as a consequence of the spin of the electron. The effect provides information on the mechanism of light radiation and on the nature of matter, i.e. it reveals the intimate structure of the atom and behaviour of its components.

Zeeman was born in a small village in Holland. After finishing his schooling he entered the University of Leiden. In 1894 he finished his Ph D and later became 'Privatdozent' (extra-mural lecturer) at the same place, where he discovered the above mentioned effect in 1896.

In 1908 Zeeman became the Director of the Physics Laboratory. As precision measurement in the field of electromagnetism is rather sensitive to vibrations a special laboratory was built for him in 1923, to perform vibration-free experiments (see <http://www.nobel.se/laureates/physics-1902-2-bio.html>, dated 14 July 1998). He worked here from 1897 until his retirement in 1935.

Zeeman's scientific work had profound implications in the theory of relativity, investigations of the magnetic resolution of spectral lines of certain noble gases, study of hyperfine structure and Zeeman effect of the strong spectral lines of rhenium.

Raman-Zeeman contact

In 1924, following an invitation from the British Association for the Advancement of Science Raman went to Canada. From there he travelled to the United States, where he was invited by the Nobel Laureate R. A. Millikan (1868-1953) to stay at the California Institute of Technology, Pasadena. Raman met Zeeman during this visit. Zeeman recalled, 'I enjoy remembering our meeting in Philadelphia' (Zeeman to Raman, dated 11 July 1931).

Raman's first letter to Zeeman dated back to 12 June 1931, in which he

invited the latter to become an honorary fellow of the Indian Association for the Cultivation of Science. On 11 July 1931 Zeeman replied: '... It was a great pleasure for me to receive your letter. I accept with enthusiasm (enthusiasm) the Foreign Membership of a Society on which your name sheds a special lusture. Will you be so kind as to interpret my feelings of gratitude to the Council and members of the Society.' Nearly four years later Raman's second letter followed in which he asked Zeeman to accept the Fellowship of the Indian Academy of Sciences, Bangalore which was founded in April 1934.

In 1937 Raman visited different universities in Bologna, Vienna, Berlin, Copenhagen, Amsterdam and Liege. During his stay in Amsterdam, Raman was asked to take the prestigious Zeeman Chair as his letter to a British physicist O. W. Richardson (1879-1959) shows. It follows: '... Among... many interesting experiences of the tour, was an offer I received to take up the Professorship of Physics at the Amsterdam University vacant by the retirement of Prof. Zeeman. I am considering the offer and have been allowed time to make my decision.' (Raman to Richardson, dated 8 November 1937).

It is a tradition in some of the European countries that a person to be asked for a chair, is allowed to determine the material conditions under which he will like to work. These include salary, research laboratories, workers and other special allowances which are needed for his research work. Raman, who already had good contact with Western scientists must have known about that. But for this particular Zeeman Chair he needed more information. So he wrote to Zeeman on 10 January 1938: 'As you may probably be aware, I have written accepting generally the call of the Faculty of Amsterdam to be your successor and have now to state the terms of appointment which

would be agreeable to me. In this connection, I am urgently in need of information on the following points (about the type of appointment – permanent or not, salary, scholarships and annual grants for material and journals) regarding the position held by you, and shall be most highly obliged if you can kindly give the same.'

Zeeman, who wanted to have a worthy successor, was convinced that Raman was a suitable candidate. He wrote: 'It gives me great pleasure that you have written accepting generally the call of the Faculty of Science of Amsterdam University, to be my successor. I will now give you the informations you ask about the position held by me. . . . Of course I will give you all advices you will want.' (Zeeman to Raman, dated 28 January 1938). Zeeman had written a long letter, in which he gave details about his salary, laboratory conditions and his assistants.

International reputation and local consideration

Raman was not only in contact with Zeeman, but also with Clay, Michels and Brouwer. Brouwer was the Dean of the Physics Department at the University of Amsterdam. The correspondence between Raman and some of the professors at the University of Amsterdam shows that the scientists were in favour of Raman's selection. On 23 February 1938 Raman wrote to Clay: 'I hope by this time, the Dean of the Faculty (Dr Brouwer) would have received my letter of the 26th January, stating my wishes (. . .) and that the Faculty and the Curatorium would have supported them. I shall be much obliged if you can kindly write me a few lines as soon as the Curatorium has made its decision in the matter.'

At the initial stage there were some doubts whether Raman would continue Zeeman's work. If he started an entirely new programme, the apparatus and laboratory which was placed at his disposal would be of no use. With regard to this problem Raman wrote to Clay on 16 March 1938, '. . . There are still many important problems in light-scattering, spectroscopy, magnetism and magneto-optics in the solution of which I am interested, and in calling me to Amsterdam, your University may feel fully assured that the equipment collected by Professor Zeeman will be fully employed.' His case was strengthened as Clay

was willing to collaborate with Raman as indicated in one of the letters. Thus this objection was swept away and the Curatorium wanted to support Raman for the Chair. However, Clay knew that there were people with a different opinion, and wrote 'I think the opposition will not have enough force against our unanimous decision' (Clay to Raman, undated letter).

Although most of the physicists in Amsterdam University preferred Raman, there were some who wanted to have a Dutchman as Zeeman's successor. For example: '. . . It is my opinion (strictly personal opinion!) that the vacancy left by Zeeman can only be fulfilled by a foreigner in the case no fellow countryman can be found that can be considered a serious candidate. For this reason I contacted the physicists outside Amsterdam, to learn their opinion on this matter. They gave me the names of Goudsmit, de Groot and Casimir and they feel that from these three names a recommendation of two persons could well be made.' (van der Waals to Zeeman, dated 11 March 1938, translated from Dutch). Although the Curators believed that Raman was an excellent scholar and an attractive offer for the university they wrote to Zeeman, '. . . we are of the opinion that such an appointment also has its risks and its drawbacks for the education. We would be willing to put these aside, in the case we had the certainty that no Dutch citizen would be available, who, on the basis of his performances, or, in case he would be young, with regard to the future, could be considered worthy to fulfil this chair' (Curators of the University to Zeeman, dated 25 April 1938, translated from Dutch). The authorities argued that teaching might suffer as Raman would not be able to teach in Dutch.

Unfortunately, circumstances were not in favour of Raman and his advocates. His supporters were equally disappointed as the letter shows. It follows: 'Curatorium fears insurmountable difficulties to carry through your appointment in the municipality. The burgomaster means, he cannot take the responsibility of an echee (failure) of your candidature. On the other hand the faculty decided not to change its opinion, but cannot hope, this changes anything, because the Curatorium only has the right of the nomination' (Clay to Raman, dated 8 July 1938). Raman in his last letter thanked Clay, Michels, and Brouwer as: 'I can never

forget the honour of the invitation of your Faculty and their enthusiastic support of my appointment' (Raman to Clay, dated 19 July 1938).

Although Raman was unconditionally supported by the faculty and Zeeman the final decision of the Curatorium was to search for a Dutch scientist. Besides the municipality and a few scientists in The Netherlands, some other European scientists were not in favour of Raman. One of the founders of quantum mechanics W. Pauli (1900–1958) wrote, 'I am happy that Raman does not come to Amsterdam, . . .'¹¹ (Pauli to Uhlenbeck, dated 27 July 1938, translated from German).

It was well known among European scientists that definitely this position was for a Dutch only. Pauli observed, '. . . In case Goudsmit does not accept and a non Dutchman can be considered, subjectively I think it will be correct to appoint K. W. Meissner. . . . Do you think that it makes sense to write to Zeeman or Goudsmit in this case?'¹¹ (Pauli to Uhlenbeck, dated 27 July 1938, translated from German).

Finally the Zeeman Chair was offered to the Dutch physicist S. A. Goudsmit (1902–1978), who together with G. E. Uhlenbeck (1900–1988) discovered the spin of the electron. Although it was a great honour to succeed Zeeman, Goudsmit did not accept the offer as he was afraid that due to the tension between Germany and its neighbouring countries a war could break out in Europe at any time. He preferred to continue his work in the United States¹¹.

A. J. Kox who is Pieter Zeeman Professor of History of Physics at the University of Amsterdam wrote, 'The procedure to find a successor to Zeeman dragged on for about 5 years: from his [Zeeman] retirement in 1935 to the appointment of C. J. Gorter in 1940' (private communication). C. J. Gorter (1907–1980) was known for his work in the field of superconductivity, the loss of electrical resistance at temperatures close to absolute zero.

Conclusion

Due to his outstanding status among the Western scientific community, Raman was invited for the prestigious Zeeman Chair at the University of Amsterdam. He was supported by Pieter Zeeman and the faculty of physics, but the local govern-

ment was opposed to him and by all means wanted to have a Dutch for the chair. The case for Raman was rejected with the argument that education of the students would suffer since Raman did not know Dutch language. The authorities might have given him a chance if he would have been younger.

1. Jayaraman, A., *C. V. Raman – A Memoir*, Affiliated East-West Private Ltd, New Delhi, 1989/1992.
2. Keswani, G. H., *Raman and His Effect*, National Book Trust India, New Delhi, 1980.
3. Krishnamurti, P., *Sir C. V. Raman – A Short Biographical Sketch*, The Bangalore Press, Bangalore, 1938.
4. Sen, S. N., *Prof. C. V. Raman – Scientific Work at Calcutta*, Published by P. G. Ghosh, Indian Association for the Cultivation of Science, Jadavpur, Calcutta, 1988.

5. Venkataraman, G., *Journey Into Light – Life and Science of C. V. Raman*, Penguin Books India (P) Ltd, New Delhi, 1994.
6. Venkataraman, G., *Raman and His Effect*, Universities Press (India) Ltd, Hyderabad 1995.
7. Ref. 5, pp. 261–283.
8. Subbarayappa, B. V., in *Pursuit of Excellence – A History of the Indian Institute of Science*, Tata McGraw-Hill Publishing Limited, New Delhi, 1992, pp. 112–151.
9. Spencer, J. B., in *Dictionary of Scientific Biography* (ed. Gillispie, C. C.), Charles Scribner's Sons, New York, 1975, pp. 597–599.
10. Wasson, T. (ed.), in *Nobel Prize Winners – An H. W. Wilson Biographical Dictionary*, The H.W. Wilson Company, New York, 1987, pp. 1157–1160.
11. Meyenn, von K. (ed.), *Wolfgang Pauli – Scientific Correspondence with Bohr, Einstein, Heisenberg and Others, 1930–1939*, Springer-Verlag, Berlin, 1985, vol. 2, p. 593.

ACKNOWLEDGEMENTS. We thank Prof. J. A. Kox (Pieter Zeeman Professor of History of Physics, University of Amsterdam) for correspondence concerning the Zeeman Chair, and permission to use the same. We thank the Boorhave Museum for the Clay–Raman correspondence and Dr S. W. de Clercq (Maarsse, The Netherlands), who translated the Dutch letters quoted in this article. R.S. gratefully acknowledges the support through a grant from the Heinrich Böll Stiftung, Berlin.

RAJINDER SINGH
FALK RIESS

Physics Department (EHF),
University of Oldenburg,
P.O. Box 2503, D-26111,
Oldenburg, Germany

CURRENT SCIENCE

SUBMISSION IN ELECTRONIC FORM

Authors who have been informed of acceptance of their manuscripts may send the final version in electronic form on floppy diskette (3.5" preferred; IBM PC format only, *not* Mackintosh). The text of the manuscript only should be supplied as a plain ASCII file with no formatting other than line and paragraph breaks. (WordStar 5.5 or 7.0 and Microsoft Word for Windows 6.0 are acceptable, but ASCII is preferred.) A hard copy of the text, with all typesetting information (italics, bold, mathematical type, superscripts, subscripts, etc.) must accompany the electronic copy. Tables and figures must be supplied only as hard copy. The diskette must be labeled clearly with the following: manuscript number, file name, file information (ASCII or WordStar, version number, etc.).

Text may also be transmitted as ASCII only by e-mail to currsci@ias.ernet.in.

We expect that electronic submission will result in quicker processing for publication.