

REVIEWS

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Scattering of Light—C. V. Raman—The Scientific Papers of Sir C. V. Raman. (The Indian Academy of Sciences, Bangalore 560 006), 1978. Pp. xxi + 699. Price : Rs. 180.00, £ 12.00, \$ 24.00.

The publication is a collection of the Scientific papers by Sir C. V. Raman and his collaborators on the Scattering of Light, with an Introduction by Dr. S. Ramaseshan. The volume includes two lists of papers (94 and 377) and author indexes. The papers have been printed by photo-lithography from the originals.

On the occasion of the Sixth International Conference on Raman Spectroscopy held at Bangalore from 4 to 9 September 1978, Dr. S. Ramaseshan, Vice-President of the Indian Academy of Sciences, collected and arranged in chronological order the scientific papers of Professor C. V. Raman and of his students and collaborators on the Scattering of Light published during the period 1919 to 1945. This attractively printed (by type-set) volume of 700 pages contains the following sections:

1. Introduction—Historical aspects of Raman's work on light scattering—by Dr. Ramaseshan.
2. Two lists of papers (a) by Prof. Raman, and, Raman and his students (94). (b) by Prof. Raman's students and their collaborators (377).
3. Texts of the 94 papers—Pages 1 to 664 [List (a) as above].
4. Subject and Author Indexes.

Among the outstanding papers, of which Prof. Raman was the principal author, are:—

- (i) On the molecular scattering of light in water and the colour of the sea, *Proc. Roy. Soc. A*, 1922, 101f, 64–80.
- (ii) Monograph on "The Molecular Diffraction of Light", Calcutta University Press, 1922, 103 pages.
- (iii) The molecular scattering of light in dense vapours and gases, *Phil. Mag.*, 1923, 45, 113–138 (with K. R. Ramanathan).
- (iv) Two papers on the Scattering of Light by liquid boundaries in relation to surface tension, *Proc. Roy. Soc. A*, 1925, 108, 561–571, and 109, 150–157 (with L. A. Ramdas).
- (v) Magnetic double refraction in liquids—Benzene and its derivatives, *Proc. Roy. Soc. A*, 1927, 113, 511–519 (with K. S. Krishnan).
- (vi) Two papers on Electrical double refraction in relation to polarity and optical anisotropy of molecules, *Phil. Mag.*, 1927, 3, 713–723 and 724–735 (with K. S. Krishnan).

- (vii) A new radiating method, *J. Phys.*, 1928, 387–398.
- (viii) The production of new radiation by light scattering—Part I, *Proc. Roy. Soc. A*, 1929, 122, 23–35 (with K. S. Krishnan).
- (ix) Investigations of molecular structure by light scattering, *Trans. Faraday Soc.*, 1929, 25, 781–792.
- (x) The molecular scattering of light—Nobel Lecture—Stockholm (December 1930).
- (xi) The relation between colour and molecular structure in organic compounds, *Indian J. Phys.*, 1929, 4, 57–78 (with S. Bhagavantam).
- (xii) Experimental proof of the spin of the Photon, *Indian J. Phys.*, 1931, 6, 353–366 (with S. Bhagavantam).
- (xiii) Spectroscopic investigation of the solid and liquid states, *Curr. Sci.*, 1942, 11.
- (xiv) The α - β transformation of ceroid was obtained in 1940, 145, 147 (with Ramaseshan).

Of the 94 papers collected from a number of investigators have shown that on 91, original body is incubated in haemolymph of the European Universities Conference at Oxford in the summer of 1921. During his return voyage in September 1921, he made critical observations of the colour and polarisation of the light from the sea and sky, and came to the conclusion that the blue colour of the sea was not due to reflection of blue light from the sky, but was due to molecular scattering of light from the sun and sky by the clear waters of the deep seas.

Immediately on his return to Calcutta, Prof. Raman with the assistance of a few students, started laboratory work on the scattering of light by pure water and pure distilled liquids with a view to establish the validity of the Einstein-Smoluchowski formula which is based on the theory of thermodynamic fluctuations in the density of fluids. As the work progressed, ideas for further work grew rapidly in Prof. Raman's mind. This can be seen from the number of communications which he made to scientific journals in 1921 and 1922.

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These included many important papers including the 103 page monograph on Molecular Diffraction of Light published on 11 February 1922 by the Calcutta University Press and reproduced in the volume under review. In the last chapter of this monograph, Prof. Raman envisaged the possibility that light itself may be emitted and absorbed by atoms as quanta as in

Rayleigh Scattering of X-rays. From 1923, systematic work was started to test out the consequences of this idea—After 5 years of continuous inspired work by Prof. Raman, Sri K. S. Krishnan and Sri S. Venkateswaran, the Raman Effect was discovered on 28 February 1928.

As Prof. Raman said in his Faraday Society's lecture, "The discovery of the effect was no accident, but was the result of systematic research on the subject of the molecular scattering of light continued for several years in the hope that results of a fundamental character could be reached".

The present volume of papers by Prof. Raman and his collaborators should be in the Library of every graduate and post-graduate Institution. It will be a source of inspiration to young aspiring scientists, as the volume portrays the step-by-step growth of the subject of Light Scattering at the hands of a great teacher.

Considering the size, the quality of printing and the general get-up of the volume, the price is very modest.

K. R. RAMANATHAN.

Use of Satellite Imagery in Tropical Cyclone Analysis (WMO-Technical Note No. 153). (World Meteorological Organization, Geneva, Switzerland) 1977. Pp. vi + 84. Price: Not given.

The introduction of meteorological satellites as serving platforms in space has brought innumerable benefits, not the least of which is the ability to detect tropical storms over data-sparse ocean areas, follow their subsequent movements and predict accurately their arrival at coastal areas. All the tropical oceans of the world will be covered by a system of five stationary meteorological satellites during the first GARP Experiment to be conducted in 1979. For the first time full and continuous coverage will be available of the Indian Ocean of immediate interest and importance to our country.

Systematic techniques have been developed in recent years in the use of satellite cloud pictures for providing information for both the analysis of tropical cyclones and the forecasting of their intensity. The present volume, the third in the series of WMO Technical Notes on the use of satellite pictures in weather analysis

and forecasting, provides detailed guidance in the interpretation of images of tropical cyclones from meteorological satellites and will be invaluable to all those whose responsibilities entail the provision of forecasts and warnings of tropical cyclones.

Chapters 1 to 4 contain excellent introductory and background information. Chapter 5 deals with the major concepts of the technique and gives some details of its applications with illustrations. The technique is essentially a system for classifying tropical cyclones and disturbances based on certain cloud patterns and measurable cloud features. The classification is closely related to cyclone intensity, an empirical model of tropical cyclone development and decay providing the basis for this classification. The cloud features emphasized in the technique are, to some extent, the tangible manifestations of thermal and wind conditions known to be influential in tropical cyclone development or non-development. The method, though largely empirical, is therefore supported by both observation and theory. The question as to how accurately storm intensity can be estimated from satellite pictures persists, since all measurements within storms—be they satellite, aircraft or ground based observations—are subject to error and uncertainty. The problem is further complicated by the short term variability of wind speeds and eye positions. Over large areas of the tropical oceans the satellite is almost the only source of meteorological information and for such areas the full use of the technique should prove highly advantageous.

While the analysis rules developed apply mainly to the North Atlantic and North Pacific Oceans, studies by Indian meteorologists have shown them to be not very different for the Indian Ocean cyclones and the technique described in this volume thus finds universal application.

The book contains excellent photographs of many of the severe cyclones observed throughout their life-cycle during the last sixty years. The photographs of the "infamous tropical cyclone of 1970" that devastated coastal areas of Bangla Desh and caused the death of over 300,000 people form the frontispiece. The high quality of the paper and printing and the superb pictures make the book a pleasure to handle and read.

A. MANI.