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Contribution to Physics: Sir C. V. Raman

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***Abstract*:** This Paper is about one of the most famous Indian physicist Sir C. V. Raman and about his contribution in the field of Physics. He is well known for his ground-breaking work in the field of light scattering, which earned him Noble Prize of Physics. He found that when light navigates a straightforward material, a portion of the avoided light changes wavelength. This wonder, along these lines known as Raman scattering, comes about because of the Raman effect.

***Index Terms*—** *Light Scattering, Noble Prize, Wavelength, Raman Effect.*

I. INTRODUCTION

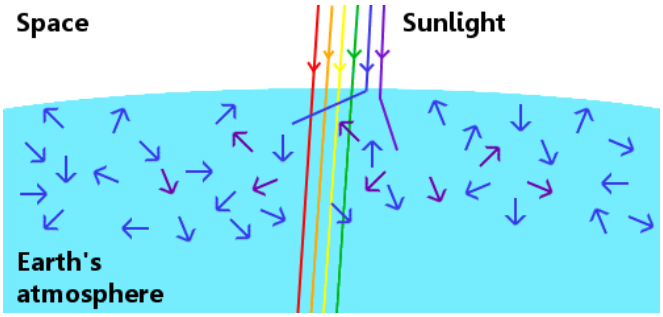
C.V. Raman, Fully Sir Chandrasekhara Venkata Raman,(Born Gregorian Calender Month Seven) 1888, Trichinopoly, India—Died Gregorian Calender Month Twenty One 1970, Bangalore), Bharat Man Of Science Whose Work Was Prestigious Within The Growth Of Science In India. He Was The Recipient Of The Honour For Physics In 1930 For The Invention That Once Light Traverses A Clear (Transparent) Material. A Number Of Light That's Deflected Changes In Wavelength. This Development Is Currently Refeered To As Raman Scattering And Is That The Result Ofthe Raman Effect.

In the wake of acquiring a graduate degree in material science at Presidency College, University of Madras, in 1907, Raman turned into a bookkeeper in the back bureau of the Indian government. He moved toward becoming teacher of material science at the University of Calcutta in 1917. Concentrate the diffusing of light in different substances, in 1928 he found that when a straightforward substance is enlightened by a light emission of one recurrence, a little bit of the light develops at right points to the first course, and some of this light is of unexpected frequencies in comparison to that of the occurrence light. These alleged Raman frequencies are the energies related with advances between various rotational and vibrational states in the dissipating material. Raman was knighted in 1929, and in 1933 he moved to the Indian Institute of Science, at Bangalore, as leader of the division of material science. In 1947 he was named chief of the Raman Research Institute there and in 1961 turned into an individual from the Pontifical Academy of Science. He added to the working up of almost every Indian research foundation in his opportunity, established the Indian Journal of Physics and the Indian Academy of Sciences, and prepared several understudies who discovered vital posts in colleges and government in India and Myanmar (Burma). He was the uncle of Subrahmanyan Chandrasekhar, who won the 1983 Nobel Prize for Physics, with William Fowler. In 1954, India respected him with its most elevated regular citizen grant, the Bharat Ratna.

II. CONTRIBUTION IN PHYSICS

A. Raman and Rayleigh Scattering

Lord Rayleigh, who had believed the teen Raman's papers were the work of a professor, had been one in every of the good physicists of his day. He had won the 1904 honour in Physics. His importance to Raman's story is that John William Strutt had been the primary to clarify why the sky is blue. He had then explained the sea's color by locution it had been merely a mirrored image of the sky's color. One day, within the summer of 1921, Raman was on the deck of a ship within the Mediterraneanon the way to the Congress of Universities of nation Empire at Oxford. He checked out the attractive blue color of the Mediterranean and started to doubt Rayleigh's rationalization of its color. Lord Rayleigh had properly explained that the sky appearance blue as a result of a development currently referred to as Rayleigh scattering.



An approximate illustration of Lord Rayleigh scattering in Earth's atmosphere. If Earth had no atmosphere, anyone who happened to be around in such circumstances would see a white sun and a black sky. However, this is often not what we tend to see, as a result of daylight interacts with the gases in Earth's atmosphere. instead of coming back straight to our eyes from the sun, daylight is scattered all told directions by the atmosphere. Blue lightweight is scattered most, which means that it involves our eyes from all over within the sky, thus the sky appearance blue. Yellow and red lightweight are scattered least, thus we tend to typically see a yellow sun, and generally a red sun. Lord Rayleigh scattering is elastic. this implies that photons of sunshine lose no energy after they move with gas molecules. The light, therefore, stays an equivalent color.

B. Raman Discovers that the ocean Scatters light-weight

When he sailed back to Republic of India in Gregorian calendar month 1921 Raman, associate tireless individual, had with him some easy physics apparatus: a prism, a miniature optical instrument, and a optical device. He used these to review the sky and therefore the ocean and terminated that the ocean was scattering light-weight. thus once Lord Rayleigh aforesaid the sea's color is solely a mirrored image of the sky's color, he wasn't completely correct. Raman according his findings in a very letter to the journal Nature. once he came back to his laboratory, Raman associated his students began an thorough going program of analysis into light-weight scattering.

Arthur Compton Demonstrates inflexible Scattering

In 1923 Compton in St. Louis, USA revealed exciting new work showing that X-rays will lose energy once they move with electrons. The X-rays give a number of their energy to electrons, then go on carrying less energy. In alternative words, Arthur Compton incontestible that inflexible scattering is feasible Arthur Compton received the 1927 honour in Physics for this discovery that became called the Arthur Compton

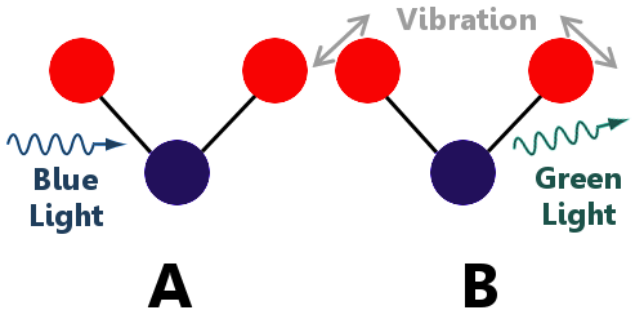
impact. the importance of the Arthur Compton impact is that in classical electrodynamics the scattering of X-rays and alternative radiation should be elastic. Compton's results united with scientific theory instead of classical theory.

The inflexible scattering discovered by Arthur Compton caused X-ray wavelengths to extend. If inflexible scattering and therefore longer wave lengths were attainable for visible radiation, then the light's color would amendment

C. The Raman impact

Raman and his students continuing researching light-weight scattering in gases, liquids and solids. They used monochromatic light-weight – daylight that had been filtered to go away solely one color – and located that a spread of various liquids – sixty of them – did so amendment the colour of the sunshine. They 1st determined this in Gregorian calendar month 1923, however terribly weak. In 1927 they found a very strong color amendment in light-weight scattered by glycerin (then referred to as glycerine). Raman's team determined the impact in gases, crystals and glass. The impact may need been mistaken for visible light, another development within which light-weight has its color modified, however in Raman's work the sunshine scattered by liquids was polarized, that dominated out visible light. What came to be called the Raman impact – a color amendment in the course of polarization – had never been seen before. The inflexible scattering at its heart was an extra, terribly sturdy confirmation, of scientific theory.

Approximate Representation of the Raman Effect



(A) Blue lightweight approaches a molecule, so (B) Lower energy green light weight leaves the molecule. this can be inflexible scattering: the sunshine has given a number of its energy to the molecule, inflicting it to vibrate a lot of powerfully proximate illustration of the Raman result

The Raman impact could be a terribly tiny impact compared with Lord Rayleigh scattering. solely regarding one in 10million photons undergoes inflexible scattering. Raman and his colleague K.S. Krishnan reported their discovery in March 1928 in Nature. Raman was awarded the 1930 honor in Physics for "work on the scattering of sunshine and for the invention of the impact named when him."

E. Raman spectroscopic analysis

Raman showed that the energy of photons scattered inelastically is a 'mark' for the substance the sunshine is scattered from. As a results of this, Raman spectroscopic analysis is currently normally utilized in chemical laboratories everywhere the globe to spot substances. it's additionally utilized in medication to research living cells and tissues – even detection cancers – while not inflicting damage. optical device light-weight instead of daylight is employed because the supply of photons.

F. The Photon's Spin

In 1932 Raman and his student Suri Bhagavantam discovered that photons of light carry angular momentum – in quantum terms, photons possess a property called spin. Light and other forms of electromagnetic radiation pass their angular momentum on to atoms that absorb them.

III. PERSONAL LIFE

He was married on 6 May 1907 to Lokasundari Ammal (1892–1980). [1] They had two sons, Chandrasekhar and radio-astronomer Radhakrishnan. Raman was the paternal uncle of Subrahmanyam Chandrasekhar, who later won the Nobel Prize in Physics (1983) for his discovery of the Chandrasekhar limit in 1931 and for his subsequent work on the nuclear reactions necessary for stellar evolution

IV. ACHIEVEMENTS

In 1921, Raman noticed the blue color of glaciers and also the Mediterranean. He was motivated to get the explanation for the blue color. Raman applied experiments concerning the scattering of sunshine by water and clear blocks of ice that explained the phenomenon.

Raman used monochromatic light source that penetrated clear material and was allowed to fall on a spectrograph to record its spectrum. He detected lines within the spectrum, that were later known as Raman lines. He given his theory at a gathering of scientists in Bangalore on sixteen March 1928, and won the honor in Physics in 1930. In Munich, some physicists were at the start unable to breed Raman's results, resulting in unbelief. However, Peter Pringsheim was the primary German to breed Raman's results with success. He sent spectra to Arnold Sommerfield. Pringsheim was the primary to coin the term "Raman effect" and "Raman lines."[2]

V. HONORS AND AWARDS

He was appointed a Fellow of the Royal Society [3] early in his career (1924) and knighted in 1929. He resigned from the Fellowship of the academy in 1968 for some reasons, there for} Indian FRS ever to try to to so.[4]

In 1930 he won the honor in Physics.
In 1941 he was awarded the Franklin honour.
In 1954 he was awarded the India Ratna.[5]
He was honored the Vladimir Ilich Lenin Peace Prize in 1957.
In 1998, Indian Association of Science noticed Raman's discovery as globe Historic Chemical Landmark.[6]
India celebrates National Science Day each year to commemorate the invention of the Raman result in 1928.[7]

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