Chandrasekhara Venkata Raman

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Contributor: Nitin Kumar Singh

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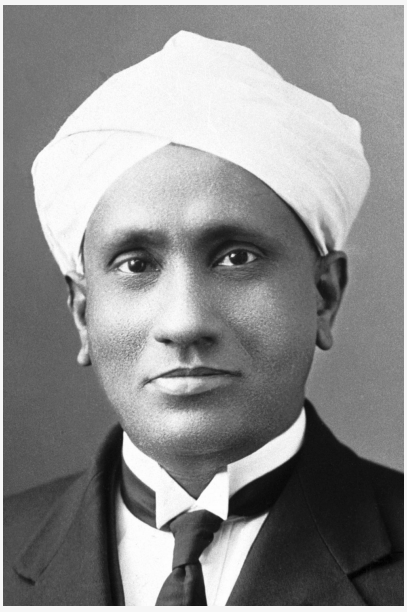
Basic Information



Name: Chandrasekhara Venkata Raman
(Nov 1888–Nov 1970）

Birth Location:	Tiruchirappalli, India
Title:	physicist
Affiliations:	Indian Audit and Accounts Service University of Calcutta Indian Institute of Science
Honors:	Nobel Prize Bharat Ratna

1. Introduction

Chandrasekhara Venkata Raman, born on November 7, 1888, and passed away on November 21, 1970, was a distinguished Indian physicist renowned for his contributions to the study of light scattering. Alongside his student K. S. Krishnan, he developed a spectrograph and made a groundbreaking discovery – the modification of light scattering when it passes through a transparent material. This phenomenon, termed "modified scattering" or the Raman effect, earned Raman the 1930 Nobel Prize in Physics, making him the first Asian to receive a Nobel Prize in any scientific field. Raised in a Tamil Brahmin family, Raman displayed exceptional academic prowess, completing his secondary and higher secondary education by the ages of 11 and 13, respectively. He excelled in physics, topping the bachelor's degree examination at the University of Madras at the age of 16. Raman's early

research on light diffraction was published in 1906 while he was still a graduate student. He later joined the Indian Finance Service but found his passion for research at the Indian Association for the Cultivation of Science (IACS) in Calcutta. In 1917, he became the first Palit Professor of Physics at the Rajabazar Science College under the University of Calcutta. During a trip to Europe, Raman challenged prevailing explanations for the blue color of the sea and founded the Indian Journal of Physics in 1926. In 1933, he became the first Indian director of the Indian Institute of Science in Bangalore and established the Indian Academy of Sciences. Raman continued his scientific endeavors, founding the Raman Research Institute in 1948, where he worked until his last days. The Raman effect, discovered on February 28, 1928, is commemorated annually as National Science Day by the Government of India.[1]

2. Early Life and Education

C. V. Raman was born in Tiruchirappalli, British India, to Iyer Brahmin parents Chandrasekhar Ramanathan Iyer and Parvathi Ammal. He was the second of eight siblings. His father, a local high school teacher, had a modest income, and the family later moved to Visakhapatnam in Andhra Pradesh. Raman attended St Aloysius' Anglo-Indian High School in Visakhapatnam, passing matriculation at 11 and the First Examination in Arts at 13, securing the top position in both. In 1902, he joined Presidency College in Madras, obtaining a B.A. degree in 1904 from the University of Madras with first place and gold medals in physics and English. At 18, he published his first scientific paper while still a graduate student. In 1907, he earned an M.A. degree with highest distinction from the same university, publishing a second paper on the surface tension of liquids. Recognizing Raman's potential, his physics teacher Rhishard Llewellyn Jones encouraged him to pursue research in England. However, due to health concerns, a physical inspection led by Colonel (Sir Gerald) Giffard suggested Raman would not withstand England's harsh weather, preventing him from pursuing studies there.[1]

3. Career

C. V. Raman's elder brother, Chandrasekhara Subrahmanya Ayyar, had entered the Indian Finance Service, the esteemed government service in India. Following suit due to limitations on studying abroad, Raman secured the top position in the entrance examination in February 1907 and joined the Indian Finance Service, becoming Assistant Accountant General in Calcutta in June 1907. Impressed by the Indian Association for the Cultivation of Science (IACS) in Calcutta, he developed influential connections with figures like Asutosh Dey, Amrita Lal Sircar, and Ashutosh Mukherjee. With their support, he conducted research at IACS during his own time, contributing to the institute's first research paper. Transferred to Rangoon in 1909, Raman returned to Madras due to his father's illness. Subsequently posted to Nagpur in 1910, he was swiftly promoted to Accountant General in 1911 and returned to Calcutta. Starting in 1915, Raman supervised research scholars at IACS, marking the beginning of his mentoring role. Following Sircar's death in 1919, he attained honorary positions at IACS and referred to this period as the "golden era" of his life. In 1913, the University of Calcutta appointed Raman as the Palit Professor of Physics, a position he officially assumed in 1917 due to World War I. Despite objections over his lack of a PhD and foreign study, Raman's reputation grew, culminating in an honorary DSc from the University of Calcutta in 1921. He

established the Indian Journal of Physics in 1926 and reported the Raman effect in 1928. Raman later became the director of the Indian Institute of Science (IISc) in Bangalore, where he recruited notable scientists. In 1934, he founded the Indian Academy of Sciences and initiated the Calcutta Physical Society in 1917. Additionally, he co-founded Travancore Chemical and Manufacturing Co. Ltd. in 1943 with his former student Panchapakesa Krishnamurti. Appointed as the first National Professor in 1947, Raman retired from IISc in 1948 and established the Raman Research Institute in Bangalore, where he served until he died in 1970.[1]

4. Scientific Contributions

Raman made a significant contribution to the understanding of light scattering through his discovery of the Raman effect. In 1923, after unraveling the cause of the blue color of water, he shifted his focus to the underlying principle behind this phenomenon. His 1923 experiments revealed the presence of additional light rays when sunlight passed through violet glass in certain liquids and solids, initially thought to be a "trace of fluorescence." In 1925, Research Associate K. S. Krishnan identified a theoretical basis for an extra scattering line in the presence of liquid, referring to it as "feeble fluorescence." The theoretical attempts to explain this phenomenon were largely unsuccessful for the next two years. The turning point came with Arthur Compton's discovery of the Compton effect in 1927, demonstrating that electromagnetic waves could be described as particles. Inspired by this, Raman and Krishnan began their experiments in January 1928. On January 7, Krishnan observed polarized fluorescence in all pure liquids, leading to the term "modified scattering." The manuscript, titled "A new type of secondary radiation," was submitted to Nature on February 16 and published on March 31. On February 28, 1928, they successfully obtained spectra of the modified scattering separate from the incident light, facilitated by Raman's invention of a spectrograph for detecting and measuring electromagnetic waves. This marked the inception of the Raman effect, a groundbreaking discovery in the field of light scattering.[1]

References

1. C. V. Raman. Wikipedia. Retrieved 2024-2-14