Augustin-Jean Fresnel Biography

Augustine-Jean Fresnel was a French physicist and engineer who made valuable contribution in the field of wave optics. Know more about his life in this brief biography.

Quick Facts	
Famous as	Physicist
Nationality	French, American
Born on	10 May 1788 AD
Zodiac Sign	Taurus
Born in	Broglie (Eure)
Died on	14 July 1827 AD
Place of death	Ville-d'Avray (Hauts-de-Seine)
Married	No
Education	École Polytechnique
Discoveries / inventions	Fresnel Lens
Works & Achievements	Fresnel is credited for his invention of the 'Fresnel lens' and was awarded the 'Rumford Medal' by the Royal Society of London for his contributions.
Awards	1827 - Rumford Medal

Augustin-Jean Fresnel was a French physicist best remembered for his invention of compound lenses that transform the radiance of lighthouses and help save many ships from crashing into the rocks at sea. He developed formulas to elucidate refraction, double refraction, reflection and polarized light and also

proved that light was a collection of transverse waves. The son of an architect, he grew up to be a brilliant student and received his education from École Polytechnique and École des Ponts et Chaussées. He embarked on a career as an engineer and began his research in optics. He researched on the diffraction of light and proposed the aether drag hypothesis in addition to many other discoveries and deductions. Building on the work of English physicist Thomas Young, he helped to establish the wave theory of light. But sadly, like most thinkers ahead of their time, Fresnel's genius and extraordinary work in the field of optical science did not receive much recognition during his lifetime. Fresnel remained undeterred by this lack of appreciation and at all times remained focused on his research and work. Many of his theses and works were printed by the Académie des Sciences after several years of his passing.

Childhood & Early Life:

- Born on May 10, 1788, Augustin-Jean Fresnel was son of Jacques Fresnel and Augustine Merimee. His father was an architect.
- He was a slow learner as a child and was unable to read even when he was eight years old. He began his education in Ecole Centrale in Caen, after which he went to Ecole Polytechnique for higher secondary education and finally to Ecole des Ponts et Chausses, so that he could become a Civil Engineer.

Career:

- After graduation, Fresnel served for a short term as an army engineer but was decommissioned in 1814, as he supported Bourbons.
- Fresnel began his research on optics in 1814. He conducted experiments and observations using his devices to study diffraction and interference fringes, which led him to believe that the 'wave theory of light' proposed by English physicist, Thomas Young, was right.
- He presented his findings on the aberration of light to the French Academy of Sciences in 1815; though appreciated, the paper was never published. The same year, he was appointed as an engineer in Paris and spent most of his life there.
- In 1816, Fresnel extended the work of Dutch physicist Christiaan Huygens and showed that Huygens' principle, together with his own principle of interference could explain both the rectilinear propagation of light and also diffraction effects.
- He pioneered the construction of a unique kind of lens that replaced the use of mirrors in lighthouses and increased their functionality.
- In 1817, Fresnel discovered circularly polarized light, which proved that light, in fact, was a transverse wave and not a longitudinal wave.
- Fresnel was appointed as the commissioner of lighthouses, in 1819 and by 1821 he was able to show via mathematical methods that polarization could be explained only if light was entirely

transverse, with no longitudinal vibration whatsoever.

- He proposed the aether drag hypothesis stating that the aether is partially entrained by matter. His theory of an (almost) stationary aether predicts positive results by experiments which are sensitive enough to detect second order effects. However, his theory of aether has been refuted by experiments such as the Michelson–Morley experiment and the Trouton–Noble experiment which gave negative results.
- He also collaborated with others in his work. Along with François Arago he studied the laws of the interference of polarized rays. Their work led to the discovery of the Fresnel–Arago laws which are three laws that summarize some of the more important properties of interference between light of different states of polarization.

Major Works:

- Augustin-Jean Fresnel invented the Fresnel lens for lighthouses, a type of compact lens that can be made much thinner than a comparable conventional lens. A Fresnel lens can capture more oblique light from a light source as they can be constructed with large aperture and short focal length.

Awards & Achievements:

- In 1819, he received the prize of the Académie des Sciences at Paris for his memoir on diffraction.
- The Royal Society of London awarded him the Rumford Medal in 1827, shortly before his death.

Personal Life & Legacy:

- Fresnel came from a religious background. His family members were the followers of Catholic bishop, Cornelius Otto Jansen, and followed his ideology called the Jansensist values.
- Fresnel suffered from poor health all his life and was often exhausted due to overwork. However, in spite of all this, he continued to perform his experiments and researches with great passion and determination throughout his life.
- He passed away on July 14, 1827 after suffering from tuberculosis for a brief period.
- Augustin-Jean Fresnel’s name has been memorialized along with 72 other names on the Eiffel Tower.
- In his honor, an escarpment on the moon has been named ‘Rimae Fresnel’ along with ‘Promontorium Fresnel’.
- Many of Augustin-Jean Fresnel’s writings were clubbed and presented in a book called 'Oeuvres completes d'Augustin Fresnel, Henri de Senaramont, Emile Verdet and Leonor Fresnel.