Faraday and the Electromagnetic Theory of Light

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History of Science:

Electromagnetic Waves of Light

The phenomenon of double refraction was discovered in crystals of Iceland spar by Erasmus Bartholin in Copenhagen in 1669. It was Augustin-Jean Fresnel (1788-1827) in France in 1818 who described this phenomenon in terms of polarization. The incident light beam waves are vibrating in all directions. Only the incident light that is vibrating in the same plane is absorbed through the first polarizing crystal while light vibrating at right angles to the crystal plane is passed through. The wave passing through is subsequently blocked by the second polarizer because this polarizer is oriented horizontally with respect to the light wave.
In 1845, Michael Faraday (1791-1867) discovered that a magnetic field influenced polarized light. He found that the plane of vibration of a beam of linearly polarized light incident on a piece of glass rotated when a magnetic field was applied in the direction of propagation of the beam. This was one of the first indications that electromagnetism and light were related. The following year, in May 1846, Faraday published the article “Thoughts on Ray Vibrations” in which he speculated that light could be a vibration of the electric and magnetic lines of force. He believed in the unity of all the forces of nature, and in particular of light, electricity, and magnetism. The wave theory of light was confirmed in the 1865 by the electromagnetic theory of James Clerk Maxwell (1831-1879).