George Francis Fitzgerald | Encyclopedia.com

(*b*. Dublin Ireland, 3 August 1851; *d*. Dublin, 21 February 1901)

Physics.

FitzGerald was one of the initial group, which included Heaviside, Hertz, and Lorentz, that took Maxwell's electromagnetic theory seriously and began to explore its consequences. Very few others used Maxwell's theory to obtain results beyond those investigated by Maxwell himself. Among the first attempts to use the theory for such results was FitzGerlad's paper, "Electromagnetic Theory of the Reflection and Refraction of Light," which Maxwell reviewed for the *Philosophical Transactions*, noting that it related to work carried out by H. A. Lorentz.

It is ironic that FitzGerald is best known for work that was probably of minor importance to him and was outside his work in electromagnetic theory. Together with Lorentz he is credited with being the first to explain the null results of the Michelson-Morley experiment as due to the contraction of an arm of the interferometer, which resulted from its motion through the ether. FitzGerald's ideas on the subject were published in *Science* (1889), and he also discussed the contraction hypothesis with Oliver Lodge. In a paper presented to the Physical Society in May 1892, Lodge commented, "Professor FitzGerald has suggested a way out of the difficulty by supposing the size of bodies to be a function of their velocity through ether."

In 1894 Lorentz wrote to FitzGerald about the hypothesis, and inquired whether he had indeed published on it. In his reply, FitzGerald mentioned his letter to *Science*, but at the same time admitted that he did not know if the letter had ever been printed and that he was "pretty sure" Lorentz had priority. Soon Lorentz began to refer to FitzGerald in his discussions.

Only after FitzGerald's death did English physicists begin to take any further notice. Thus in his Adam's Prize essay, published as *Aether and Matter*, Larmor discussed the Michelson-Morley experiment and the contraction effect in detail, but only Lorentz was mentioned in this connection. Two years later, Larmor, in his introduction to FitzGerald's papers claimed priority for FitzGerald on the contraction effect. E. T. Whittaker, in the *History of the Theories of Aether and Electricity*, states that Lorentz obtained the hypothesis from FitzGerald; but it appears that Lorentz' concept was independent of FitzGerald's and that he was just giving due credit to FitzGerald.

A further piece of evidence gives additional weight to the argument that the contraction effect was not an important issue with .FitzGerald . He carried on an extensive correspondence with Heaviside from 1888 to 1900, in which they discussed many major problems of the physics of the period. In all the surviving correspondence, the Michelson-Morley experiment is mentioned only once. The interest in the MichelsonMorley experiment from the time of the experiment until the development of the theory of relativity has perhaps been exaggerated.

We gather some insight into FitzGerald's view of his work from a letter to Heaviside dated 4 February 1889;

I admire from a distance those who contain themselves till they worked to the bottom of their results but as I am not in the very least sensitive to having made mistakes I rush out with all sorts of crude notions in hope that they may set others thinking and lead to some advance.

The view is of a speculator, a scientist who generates ideas but does not necessarily develop them. Although FitzGerald's papers contain many examples of sound development, this description seems fair. In the same letter he was excited by Heaviside's work on the electromagnetic field caused by a moving charged sphere:

I am very glad to hear that you have solved completely the problem . . . I was anxious to find out how much energy is lost by the earth owing to its magetisation rotating and going round the sun . . . to what extent the energy of motion of molecules could be attributed to electrical charges on them and how this part of their energy would be radiated; this might lead to a theory of forces between molecules . . . . You ask what if the velocity be grater than that of light? I have often asked myself that but got no satisfactory answer. The most obvious thing to ask in reply is "Is it possible?"

In an 1893 letter to Heaviside, this speculation is extended supporting this view of his work:

. . . have you considered what would be the extra mass of an atom owing to its atomic charge? A charge of electricity or magnetism acts like an added mass . . . this should interfere with Kepler's Laws . . .

It is worth noting that FitzGerald took seriously his responsibilities as a teacher, both in Trinity College, Dublin, where he spent his academic life as student and teacher, and throughout Ireland through the boards he served on.

BIBLIOGRAPHY

See J. Larmor, ed., *The Scientific Writings of the Late George Francis FitzGerald* (Dublin, 1902).

FitzGerald's communication to *Science* concerning the Michelson-Morely experiment was published as "The Ether and the Earth's Atmosphere", **13** (1889), 390. Steven Brush, "Note on the History of the FitzGerald-Lorentz Contraction,", in *Isis*, **58** , no. 2 (1967), 230–232, gives a full account and reproduces the original article and the correspondence between FitzGerald and Lorentz.

Alfred M.Bork