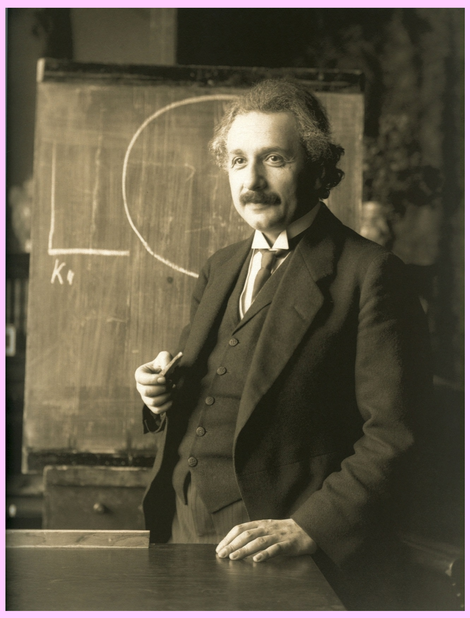
Maxwell's legacy: Scotland's greatest scientist

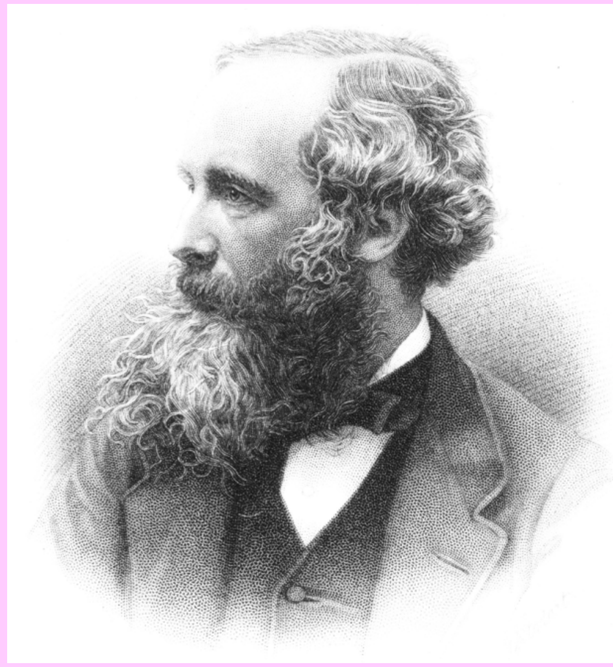


Albert Einstein, 1921, Wikipedia

- Einstein acknowledged that in many ways he drew his inspiration from Maxwell. One of the few pictures hanging in his office was of Maxwell
- Einstein's General Theory of Relativity, published in 1916, was the first of the 20th century's 'field theories', inspired by Maxwell's electromagnetic field theory, that re-defined 'reality'
- Modern fundamental physics is formulated as a series of field theories

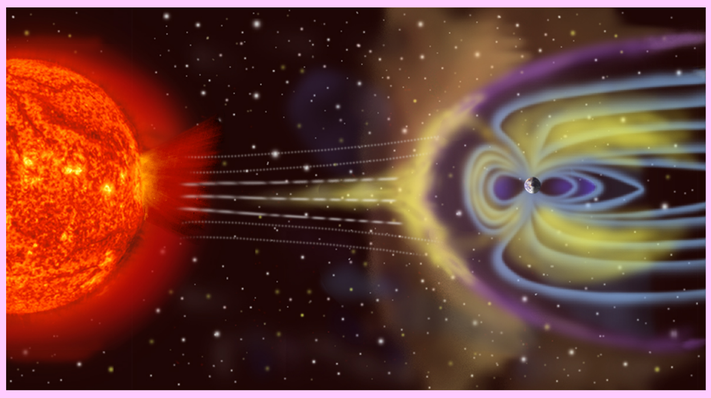
In the old Cavendish Laboratory building

James Clerk Maxwell

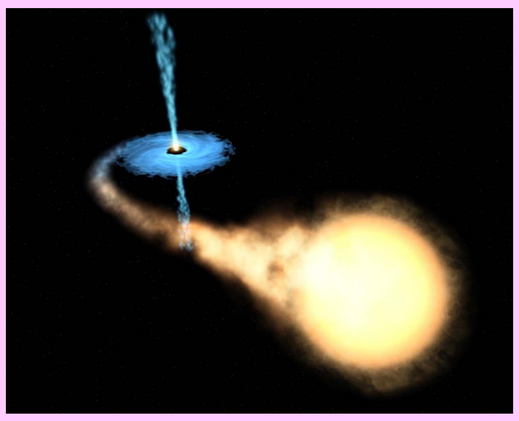


Illustrated below are just a few examples of areas where Maxwell's electromagnetic equations are key to modern developments

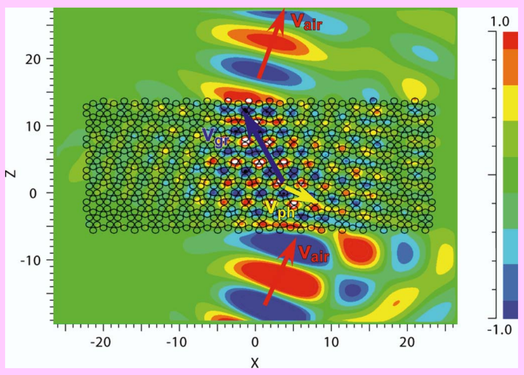
Electromagnetic communications, without which we'd have no radio, TV, mobile phones, GPS…..



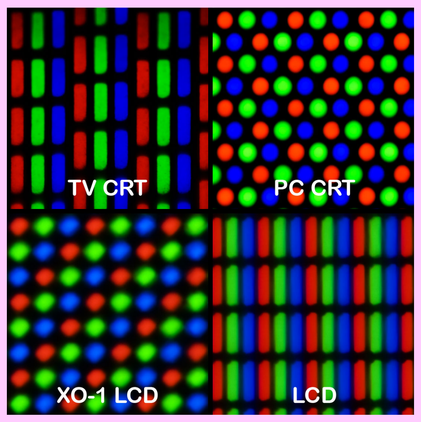
Understanding space weather is heavily dependent on understanding the electromagnetic behaviour of the Sun, the solar wind and the Earth's upper atmosphere. NASA diagram



Astrophysical discs are among the most powerful transmitters in the universe. Maxwell's equations are essential to understanding how they work



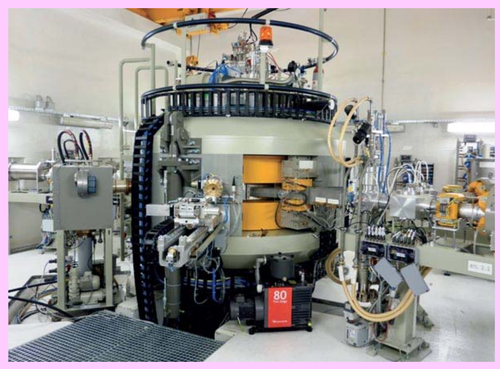
Photonic crystals, nanomaterials, metamaterials, synthetic optics…the development of tomorrow's new materials depends on Maxwell's equations. Image from SPIE Journal of Nanophotonics



Maxwell's idea of colour reproduction using 3 primary colours is the basis of colour reproduction in almost all electronic devices, as shown in the pixel diagram on the left (Wiki)

Yet more

- Maxwell's work on the theory of governors is credited with inaugurating the field of cybernetics
- Maxwell designed the Cavendish laboratory in Cambridge and was first Professor there (in 1871). The Cavendish has been the world's most successful and influential physics laboratory
- Maxwell authored textbooks that ran to many editions well into the 20th century



The design of particle accelerators, such as this small version for producing isotopes for medical use to the largest CERN accelerators, depends on Maxwell's equations. CERN Courier image

❖ Some concepts associated with James Clerk Maxwell

- *Maxwell colour triangle* (colour science)
- *Maxwell's demon* (understanding statistical physics)
- *Maxwell's equations* (electromagnetism)
- *Maxwell stress tensor* (concept in electromagnetic theory)
- *Maxwell distribution law* (behaviour of gases)
- *Maxwell-Boltzmann statistics* (concept more widely applicable than the Maxwell distribution)
- *Maxwell's thermodynamic relations* (relationships between common thermodynamic variables)
- *Maxwell-Stefan diffusion* (diffusion of a mixture of gases)
- *Maxwell's rule* for static structures (for deciding if the forces within 'pin-jointed' structures can be calculated in advance)
- *Maxwell's reciprocal theorem* (for analysing elastic structures)
- *Maxwell view* (optical instrument design)
- *Maxwell fish-eye lens* (variable refractive index lenses)
- *Maxwell fluid* (mathematical description of a visco-elastic material)
- *Maxwell effect* (birefringence shown by flowing viscous liquids)
- *Maxwell gap* (Saturn's rings)
- *Maxwell's ringlet* (Saturn's rings)
- *Maxwell unit* (Mx, the old unit of magnetic flux)
- *Maxwell coil* (for producing a particularly uniform magnetic field)

The Maxwell fracture zone (feature on the floor of the Atlantic Ocean roughly 47.7° N, 27° W), buildings, streets, academic prizes, a large telescope, a lunar crater, an asteroid, Maxwell Montes on Venus and other natural and man-made objects are named after James Clerk Maxwell

Unveiling the statue to Maxwell in George Street, Edinburgh in 2008

Aberdeen street sign

- Maxwell died in 1879, aged 48, of abdominal cancer
- The Clerk Maxwell Cancer Research Fund today promotes cancer research
- Maxwell is buried at Parton, near Glenlair
- The James Clerk Maxwell Foundation based at his birthplace in Edinburgh promotes the legacy of Maxwell

Panel by Dr John S. Reid