Raymond Hide - Commemoration

Raymond Hide was a specialist in the dynamics of fluids. He achieved important insights into meteorology and planetary atmospheres. He also studied the Earth's magnetic field – showing how it was generated by convective motions in its electrically-conducting liquid core, and how similar processes could operate in the Sun and other planets. He achieved his insights by a mixture of mathematical modelling and ingenious laboratory experiments.

Raymond was born in 1929, in a coal-mining village in Yorkshire. He attended the local Grammar School, and then gained a scholarship to study physics at the University of Manchester. Here he was lucky to be mentored by the great physicist Patrick Blackett. Blackett had become interested in understanding why the Earth, the Sun and other cosmic bodies had magnetic fields. He made a radical conjecture that there was a new fundamental law whereby gravitating bodies would get magnetised if they were spinning. This simple law relating gravity and spin was testable on the Earth because it would have implied that deep inside the Earth the field would be weaker. Blackett, along with Keith Runcorn, later to become a distinguished geophysicist, decided to test this prediction by making measurements down a mineshaft.

Raymond went along as their research assistant. The magnetic field deep down turned out to be stronger – refuting this theory. This introduction to science and its methodology had a formative and inspirational impact on Raymond.

He decided, for his PhD, to explore more complicated ways in which rotating objects get magnetised. And he became a pioneer of the now-accepted theory that in a conducting fluid (like the Earth's molten interior, or the ionized gas that the Sun is made of) convective motions could generate magnetic fields by a kind of dynamo action.

His PhD thesis was a classic. He tried to simulate the kind of convective motions that could occur in gravitating fluids by a very simple experiment. It involved two vertical glass cylinders, one inside the other. Water was placed in the annulus between them. The cylinders were spun, so that centrifugal force mimicked gravity. And the outer cylinder was kept hot, the inner one cold. This radial temperature gradient would induce convection, as inside the earth or a star.

As the spin rate increased he found a transition from a regular pattern to periodic fluctuations (which he called vacillation) and ultimately to chaotic behaviour.

These experiments were motivated by attempts to understand the Earth's interior. But Raymond realised that they were relevant to atmospheric circulation, and their ramifications motivated much of his subsequent research.

He spent a postdoctoral year working with Chandrasekhar in Chicago, followed by three years National Service back in the UK, And then a Lectureship at Newcastle, where Runcorn was now Professor. While there he further developed models for the Earth's magnetic field, and also became an expert on the dynamics of terrestrial and planetary atmospheres. And he found a fluid-mechanical explanation of something that had long fascinated him – the stable long-lived feature on Jupiter known as the Great Red Spot.

Raymond moved to the USA in 1961 as a Professor at MIT but after six years he came back to the British Meteorological Office. There he headed a Geophysical Fluid Dynamics Laboratory where he could do more elaborate experiments – for instance repeating his PhD experiment but with an electrolyte instead of water, to study magnetic effects. Meanwhile, he had extended his interest into planetary interiors. He also explored how motions in the Earth's liquid core distorted the core-mantle interface, and the consequential changes in the Earth's rotation and in the length of day.

He and his group later moved to Oxford, to work at what later became the Hooke Institute, and became a Fellow at Jesus College. After he had officially retired in 1992, he took up various visiting positions before settling in the Department of Mathematics at Imperial College, London.

He continued to work on the Earth's dynamo, and the way regular behaviour can become chaotic. By this time, computers had advanced to the stage that numerical experiments could supplement those on real fluids. In helping to understand the Earth's internal dynamo, and the transition from regular to chaotic behaviour. And

he showed how the magnetic fields in small bodies in the solar system could be generated by high-velocity impacts.

Raymond's scientific career was celebrated by a festschrift on his 80th birthday in 2009. In his last years he became frail and moved with his wife Ann to a care home, where both passed away within a few months of each other. He was 87 years old.

Raymond became a Fellow of the Royal Society in 1971 and received a CBE from the UK government in 1990, as well as other awards. He served terms, unusually, as president of both the Royal Astronomical Society and the Royal Meteorological Society.

He was elected to the Pontifical Academy of Sciences in 1996. He attended several of our meetings, speaking at four of them – always with clarity, deriving important conclusions about nature from simple models. He was a wonderful companion, and a mentor to generations of younger scientists. May he rest in peace.

Lord Martin Rees