

# What was Rutherford's greatest discovery?

01 Sep 2011 James Dacey

**By James Dacey**

This year is the 100 year anniversary since Ernest Rutherford published his seminal paper describing his discovery of the atomic nucleus. But Rutherford was an industrious researcher who many remarkable contributions to science, including three discoveries that revolutionised our view of matter.



Rutherford's first major scientific work was to lead to him being awarded the Nobel Prize for Chemistry for his investigations into the disintegration of the elements, and the chemistry of radioactive substances. One major experimental breakthrough during this period was to discover that thorium gave off an "emanation" that was radioactive. Essentially, Rutherford had discovered thorium gas.

Rutherford received the Nobel Prize in 1911, but by that time he had already spent 4 years working at the University of Manchester where he held the chair of physics for 12 years. It was during this time that Rutherford, working with colleagues including Hans Geiger and Ernest Marsden, carried out his famous scattering experiments, designed to probe the structure of the atom. The results led to Rutherford's second "eureka moment" when he realised that the majority of an atom's mass is concentrated in a relatively tiny volume at its centre – he had discovered the nucleus.

Rutherford's third big contribution was to effectively become the world's first alchemist when he transformed nitrogen into oxygen. This finding was a result of bombarding nitrogen gas with alpha particles so that higher energy protons were ejected.

Of course all three of these discoveries have transformed our view of atomic physics in different ways. But, just for a bit of fun, if you had to single out one of these three discoveries, which do you think is the greatest?

- That atoms are not always stable (his Nobel-Prize-winning work on radioactivity)
- The atoms have the majority of their mass concentrated in a nucleus
- The world's first alchemy (converting nitrogen into oxygen)

Have your say and take part in our [facebook poll](#). And feel free to post a comment on the poll to explain your reasoning.

IOP members can also watch this [short feature length film](#) about Rutherford's discovery of the atomic nucleus. It includes interviews with keynote speakers at the [Rutherford Centennial Conference](#), which was held in August at the University of Manchester.

In last week's poll we asked posed a question that is highly pertinent to the big questions surrounding the future of astronomy and the financial situation in the US. We asked whether funding be reinstated on the \$6.8 billion James Webb Space Telescope, which is poised to be the successor to Hubble Space Telescope (JWST). The question arose following a move by the US congressional committee to cancel the project after a series of over-run costs. The findings of our poll, however, were highly conclusive as 90% of respondents voted that "yes, jeep the JWST".



**James Dacey** is multimedia projects editor, *Physics World*

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