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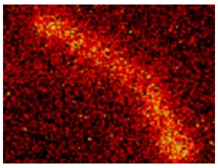

Image of tracks of two protons
Marek Pfutzner, Warsaw University

By: Gabriel Gache, Science News Editor

Unraveling the Mysteries of Radioactivity

Diprotons

The spontaneous release of various particles from atom nuclei has been dodging scientists for years, mostly due to the imprecise methods of measuring fleeting exotic nuclei and radioactivity seems to be a relatively closed subject in physics even though it was first discovered more than a hundred years ago.Marek Pfutzner, a physicist at Warsaw University in Poland that has been working in this domain along with a number of international researchers described the first ever success of radioactive decay of an iron isotope. The experiment involving iron-45, which has 26 protons and 19 neutrons, showed that this rare isotope emits occasionally a spontaneous energetic two proton pair, known as a diproton or they have been released in quick succession or simultaneously unlinked. The stable form of the iron which is most abundant of Earth has 26 protons and 30 neutrons. The main detector designed by Pfutzner is composed of a front-end gas chamber that captured the isotope and slowed it down to that of half the speed of light. The so-called front-end of the device consists of an imaging system with a digital camera that recorded ghostly images of the trajectories of the two emitted protons from the iron-45 isotope nuclei.

Data extracted from the images ruled out a previous theory that the diproton emission is described by a form of nuclei transformation, also known as three-body decay.The experiment not only discovered a new form of radioactive nuclei decay, but the technique used by Pfutzner could lead to additional new discoveries about fleeting, rare isotope nuclei which are currently being studied in science laboratories such as NSCL and could bring new understanding about the processes taking place inside neutron star and the limits of nuclear existence. In the early days of radioactivity studies, before the days of digital cameras, visual information served as raw data, the observation of the emission of particles being captured by scientists by watching tiny flashes of light given off by zinc sulfide screen placed under the microscope counting lenses when it was struck with an alpha particle, for example.