# UniS scientists to investigate the secrets of the universe

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The Nuclear Physics Group at the University of Surrey has been awarded a large scale grant worth almost half a million pounds (£483k) from the UK Engineering and Physical Sciences Research Council (EPSRC) to synthesise and study the structure of the most exotic forms of nuclear matter created to date.

The Surrey collaboration, led by Dr. Paddy Regan, Reader in Nuclear Physics, has won a four-year grant to perform a series of experiments at the € 1Billion GSI-FAIR heavy-ion research centre located at Darmstadt, Germany. This unique international facility allows scientists from all over the world to perform experiments to probe the structure of atomic nuclei, which make up more than 99.95% of all observable matter. The facility accelerates atoms to very high energies (more than 100 thousand miles per second!) before colliding them with stationary metallic 'production' targets in a process know as 'projectile fragmentation'.

The residual nuclear fragments left over from these violent collisions can form very-rare sub-species of the atomic elements found on earth, but with an abnormal number of neutrons compared to the stable elements which everyday matter is constructed from. These exotic or 'radioactive' species are of fundamental interest to scientists in understanding how the elements were originally formed in exploding stars in the early universe.

The research also has many applied spin-offs from the high-efficiency detection of radioactivity, including potential importance in areas such

as medical imaging and cancer treatment, environmental radioactivity monitoring, nuclear power generation and decommissioning, weapons limitation and nuclear anti-terrorism work. The UniS group leads a major international collaboration, known as the RISING Collaboration, which includes almost 100 physicists from over 30 different institutions around the world. Dr. Regan, who is the international spokesperson for this collaboration, said

'The award of this major research grant once again highlights the world-leading position the Nuclear Physics group at UniS holds in this highly competitive areas of fundamental research. This grant will allow us to probe deeper and further than ever before into unlocking the fundamental secrets of how the elements were created and how atoms are formed.'

The Surrey group working on this project consists of seven academics, Dr. Regan, Profs. William Gelletly OBE, Jeff Tostevin, Phil Walker and Drs. Paul Stevenson, Wilton Catford and Zsolt Podolyak.

The Physics Department at Surrey houses the largest academic research Nuclear Physics group in the UK and hosted NUSTAR05 International Nuclear Physics conference in January this year.

Source: University of Surrey