

Physicists creating mini Big Bangs at the Large Hadron Collider

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Birmingham physicists working at CERN's Large Hadron Collider (LHC) in Switzerland are gearing up to study a piece of the Universe as it would have been just moments after the Big Bang.



The LHC's ALICE experiment, with UK work funded by the Science and Technology Facilities Council (STFC), will later this week study the result of accelerating and smashing together lead nuclei at the highest possible energies, generating incredibly hot and dense sub-atomic fireballs to recreate the fundamental particles that existed in the first few microseconds after the Big Bang.

Scientists from the **School of Physics and Astronomy** (<http://www.ph.bham.ac.uk>) are playing a key role in this new phase of the LHC's programme which comes after seven months of successfully colliding protons at high energies.

'We will be creating the highest temperatures and densities ever produced in an experiment in these mini Big Bangs', said Dr David Evans. 'Although the tiny fireballs will only exist for a fleeting moment (less than a trillionth of a second) the temperatures will reach over ten trillion degrees, a million times hotter than the centre of the Sun.'

'This will allow us to make and study a tiny piece of what the universe was made of just a millionth of a second after the Big Bang', Dr Evans added. 'At the temperatures generated even protons and neutrons, which make up the nuclei of atoms, will melt resulting in a hot dense soup of quarks and gluons known as a Quark-Gluon Plasma. By studying this quark-gluon plasma physicists hope to learn more about the strong force, one of the four fundamental forces of nature, which not only binds the nuclei of atoms together but is responsible for 98% of their mass. We are all really looking forward to these first collisions which will be created in a safe, controlled environment. If all goes well we could even see some new discoveries before the end of next year.'

The 10,000 ton ALICE experiment has been specifically designed to study the extreme conditions produced in these lead collisions. ALICE is one of the four main experiments at the LHC designed to study the physics from ultra-high energy proton-proton and lead-lead interactions.

Whilst the conditions created in the LHC detector will be a world record for manmade experiments and represent a great achievement for science and engineering, they pose no threat. More energetic particle reactions occur regularly throughout the Universe, including in the upper atmosphere of the Earth itself.

See the **[Mini Big Bangs press release \(/news/latest/2010/11/2Nov-ALICE.aspx\)](/news/latest/2010/11/2Nov-ALICE.aspx)**