CoEPP
ARC Centre of Excellence for Particle Physics at the Terascale

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First new particle-smasher since the LHC comes online

A new particle collider, SuperKEKB, located at the KEK laboratory in Tsukuba, Japan has achieved "First Turns" and is now in the test operation stage. This is the newest "particle-smasher" to go online since the LHC at CERN in Geneva. SuperKEKB will be the world's highest-luminosity collider and, in association with the Belle II experiment, it will collide electrons with their antiparticles – positrons – in the search for new physics.

Designed and built at KEK by a team of Japanese accelerator physicists, SuperKEKB, along with the Belle II detector at the interaction point, will search for new physics beyond the Standard Model by measuring rare decays of elementary particles such as beauty quarks, charm quarks and tau leptons. In contrast to the LHC, which is the world's highest energy machine, SuperKEKB/Belle II is designed to have the world's highest luminosity or rate of collisions (40 times higher than its predecessor KEKB). This will make SuperKEKB the world's "highest luminosity" machine and the leading accelerator on the "luminosity frontier".

Key milestones:

- 10 February, 2016: SuperKEKB succeeded in circulating and storing a positron beam moving close to the speed of light around the 3.0 kilometre circumference of its main ring.
- 26 February, 2016: SuperKEKB electron-positron collider succeeded in circulating and storing a seven billion electron-volt energy (7 GeV) electron beam around its ring of magnets in the opposite direction.

The achievement of these "first turns" – i.e. storing the beam in the ring through many revolutions – is a major achievement for any new particle accelerator. In the case of SuperKEKB, the electron and positron beams have separate rings and different energies (7 GeV and 4 GeV, respectively). During full operation, the beams of electrons and positrons will collide and produce large numbers of new particles. The Belle II detector at SuperKEKB was designed and built by an international collaboration of over 600 students, scientists and engineers from 23 countries in Asia, Europe and North America. This collaboration is working closely with SuperKEKB accelerator experts to optimise the machine performance and backgrounds.

Dr Phillip Urquijo, Physics Coordinator of the Belle II experiment says

"Operation in this test phase is a major milestone towards collisions and physics data taking, and is the result of years of hard work at KEK. I congratulate everyone who has been involved in this monumental undertaking. Everyone in the Belle II experiment is eagerly anticipating the next steps as the accelerator is optimised and prepared for collisions next year."

About CoEPP

The ARC Centre of Excellence for Particle Physics at the Terascale (CoEPP) is a collaborative research venture between the Universities of Adelaide, Melbourne, Sydney and Monash. Our research looks at some of the fundamental questions in science and our scientists are foundation members of the ATLAS experiment at the Large Hadron Collider at CERN.

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