

## **NEWSLETTER 21** Italian National Institute for Nuclear Physics

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## **RESEARCH** THE FIRST BEAMS ARE CIRCULATING IN THE SUPERKEKB ACCELERATOR

The first particle beams were injected and stably circulated for the first time in the SuperKEKB accelerator at the KEK laboratory in Tsukuba, Japan. SuperKEKB is the first accelerator for research in

fundamental physics to come into operation after the LHC at CERN in Geneva, and has been designed to work at a luminosity never achieved before, as much as forty times greater than that of the most powerful previous generation accelerator. Unlike the LHC, in which proton beams circulate, SuperKEKB uses electron and positron beams, which travel in separate rings, 3 km in diameter and with different energies, 7 and 4 billion electron volts (GeV), respectively. SuperKEKB uses an innovative scheme of so-called "nano-beams" for collision of the beams - originally proposed by the INFN National Laboratories of Frascati for the SuperB collider project - capable of maximising the region in space in which the beams overlap, and thus the luminosity. When up to speed, the particles produced in the collisions will be detected and measured by the Belle-II experiment, a highly sensitive detector fruit of an international collaboration consisting of more than 600 physicists and engineers from 23 different countries. Belle-II will search for signs of physics beyond the currently known theories.

The Italian contribution is significant, with a community of more than 60 scientists from nine universities and INFN laboratories. The Italian groups are engaged in the construction of the three key elements of the experiment, necessary for the precise measurement of the point in which the particles decay, recognition of which particles pass through the detector and measurement of their energy. Italy also provides a significant contribution to the computing resources necessary for analysis of the huge amount of data that the experiment will collect.