

# SuperB project moves forward, preparing for construction

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The most elementary components of matter, quarks and leptons, have been found, as the result of 100 years of research, to be organized into three replicating "families". The reason for this specific number or organization remains a full mystery. Flavor physics, the detailed understanding of the relationship between these families and the comparison between properties of matter and antimatter, is one of the most promising ways to explore new physics, quite complementary to the energy frontier research most notably pursued at the CERN LHC collider. Different kinds of new physics have different effects on rare decays of bottom and charmed quarks and of heavy tau leptons. These particles are all produced at SuperB in unparalleled abundance, making possible for the first time measurements of the precision required to be sensitive to the details of new physics uncovered at CERN.

SuperB, which promises to be the flagship experiment in flavor physics, has been proposed by INFN to the Italian government for construction as an international project in the vicinity of the National Laboratory of Frascati, where colliding beam studies began in the '60's. The European Strategy Session of the CERN Council has taken note of SuperB as a regional initiative within the European roadmap.

The SuperB Conceptual Design Report (CDR) is a comprehensive document outlining the physics potential and the innovative accelerator design capable of producing the unprecedented luminosity needed to exploit it. The SuperB collider consists of two rings, which collide beams of electrons and [positrons](#), producing tens of billions of heavy quarks

and heavy leptons per year in a configuration that makes sensitive exploration of their decays readily feasible. Remarkably, this new collider can utilize many components from the recently decommissioned PEP-II accelerator at the SLAC National Accelerator Center, engendering cost savings of more than 100 million euros.

SuperB has now completed and published on arXiv.org a series of progress reports detailing the impressive progress made since the CDR, in consolidating the physics case (arXiv:1008.1541 [hep-ex]) and the design, cost and schedule of the SuperB detector and accelerator.

The new detector described in this progress report (arXiv:1007.4241 [physics.ins-det]), was written by a team of 240 physicists from nine countries. It is capable of functioning in the intense environment of the SuperB collider, representing a substantial advance in detector system technology, with improved resolution, radiation hardness and background rejection capability.

Similarly, the accelerator, described in the progress report written by more than eighty accelerator scientists from six countries and CERN (arXiv:1009.6178v1 [physics.acc-ph]), represents significant advances compared to the preliminary CDR design. It is much smaller (now 1250 m circumference), has a fully worked out lattice, incorporates a polarized electron beam, and includes flexibility in reaching its design goal of a luminosity of  $10^{36} \text{ cm}^{-2}\text{s}^{-1}$ .

In order to speed preparations toward SuperB construction, INFN management, with the agreement of the Italian government, has taken three important actions on key aspects of the SuperB project: first, the budget supporting the SuperB Technical Design Report effort in 2011 will be increased compared to the 2010 level; second, a significant increase of the number of high level engineers and machine accelerator experts devoted to the TDR through the cooperation of IN2P3/CNRS,

and finally, the launching of a comprehensive site studies to fully qualify the proposed site. INFN is thus confident that the SuperB project will be ready for a fast construction start as soon as the political green light is given. The TDR effort is also being supported by several partner countries; four of these, France, Russia, Canada, and the US, have recently signed MOUs with Italy to that effect. Preliminary efforts to draft an ERIC (European Research Infrastructure Consortium) agreement are well-advanced.

The Italian Minister for Instruction, University and Research, Mariastella Gelmini has said: "With reference to the SuperB Project which is being discussed at the European Strategy session of [CERN](#) Council, I would like to inform you that the Ministry I chair has included it in a restricted group of proposals submitted for their funding, since I appreciate the aspects of highest scientific and technological innovation of the forementioned project."

Provided by SuperB Collaboration

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