

1. SuperB executive summary

With this document we propose a new electron positron colliding beam accelerator to be built in Italy to study flavor physics in the B-meson system at an energy of 10 GeV in the center-of-mass. This facility is called a high luminosity B-factory with a project name “SuperB”. This project builds on a long history of successful e+e- colliders built around the world, as illustrated in Figure 1.1. The key advances in the design of this accelerator come from recent successes at the DAFNE collider at INFN in Frascati, Italy, at PEP-II at SLAC in California, USA, and at KEKB at KEK in Tsukuba Japan, and from new concepts in beam

manipulation at the interaction region (IP) called “crab waist”. This new collider comprises of two colliding beam rings, one at 4.2 GeV and one at 6.7 GeV, a common interaction region, a new injection system at full beam energies, and one of the two beams longitudinally polarized at the IP. Most of the new accelerator techniques needed for this collider have been achieved at other recently completed accelerators including the new PETRA-3 light source at DESY in Hamburg (Germany) and the upgraded DAΦNE collider at the INFN laboratory at Frascati (Italy), or during design studies of CLIC or the International Linear Collider (ILC).

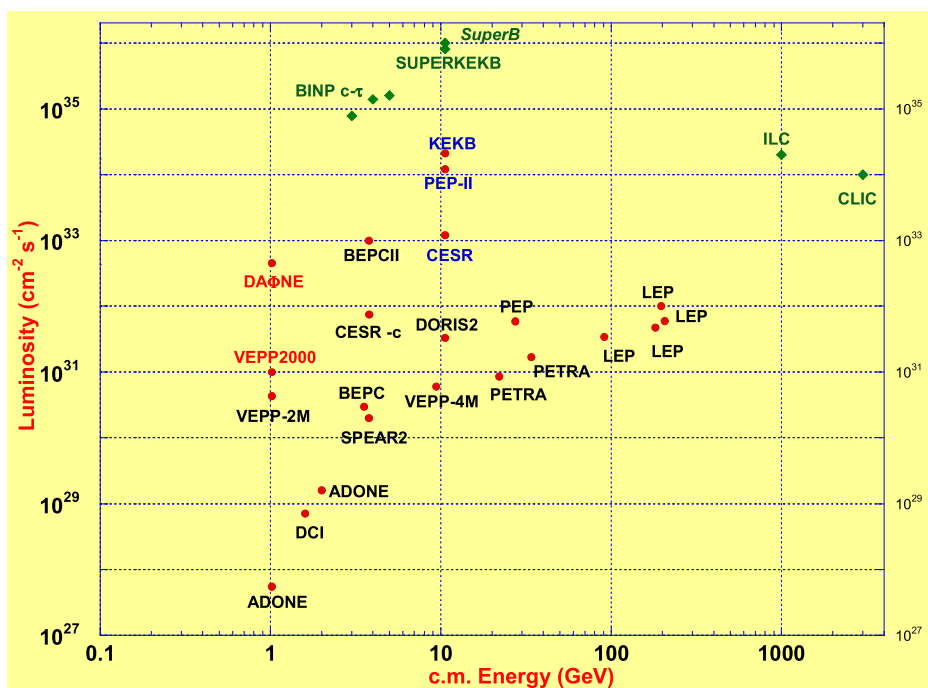


Figure 1.1 Peak luminosity versus e+e- collider center-of-mass energy. SuperB is shown at the center of the plot at a luminosity of $10^{36}/\text{cm}^2/\text{s}$.

The project is to be designed and constructed by a worldwide collaboration of accelerator and engineering staff along with ties to industry. To save significant construction costs, many components from the PEP-II collider at SLAC will be recycled and used in this new accelerator. The interaction region will be designed in collaboration with the particle physics detector to guarantee successful mutual use.

The accelerator collaboration will consist of several groups at present universities and national laboratories. In Italy these may include INFN Frascati and the University of Pisa, in the United States SLAC, LBNL, BNL and several universities, in France IN2P3, LAPP,

and Grenoble, in Russia BINP, in Poland Krakow University, and in the UK the Cockcroft Institute.

The construction time for this collider is a total of about four years. The new tunnel can be bored in about a year. The new accelerator components can be built and installed in about 4 years. The shipping of components from PEP-II at SLAC to Italy will take about a year. A new linac and damping ring complex for the injector for the rings can be built in about three years.

The commissioning of this new accelerator will take about a year including the new electron and positron sources, new linac, new damping ring, new beam transport lines, two new collider rings and the