

Significant 'events' at the B Factory

Exploring fundamental composition of the universe

BY MICHAEL RIORDAN

Physicists working through the night on the new particle collider under construction at the Stanford Linear Accelerator Center (SLAC) have achieved a major milestone: In the early morning of May 26 they successfully recorded the first events in the detector that surrounds the point where the massive machine's two particle beams collide. These events indicate that the new Department of Energy facility, called the Asymmetric B Factory, is working as planned.

"Now that the B Factory is up and running, it can provide valuable evidence that will extend our understanding of the fundamental composition of the universe," said Secretary of Energy Bill Richardson. "I applaud the contributions of the three DOE Labs and the international collaboration of 600 scientists from nine nations that built this particle collider and its detector."

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The collider was constructed by SLAC, the Lawrence Berkeley National Laboratory and the Lawrence Livermore National Laboratory with \$177 million in U.S. government funding. It brings energetic beams of electrons and their antimatter counterparts, called positrons, into collision at the core of a

1,2000-ton particle detector called BaBar. The energies of the beams soon will be precisely tuned to produce large quantities of heavy subatomic particles known as B mesons.

A novel feature of the new collider is that the two beams have different energies: 9 billion volts for the electrons and 3.1 billion volts for the positrons. This disparity greatly enhances experimenters' opportunities to extract new and interesting information about these exotic, short-lived particles.

The BaBar detector was built by scientists and engineers from 73 institutions in the United States, Canada, China, France, Germany, Great Britain, Italy, Norway and Russia. It has cost about \$110 million in all, with 40 percent of the total coming from foreign sources. Its goal is to study the phenomenon that physicists call CP violation -- a fundamental difference between matter and antimatter.

"This is the first big step in our attempt to measure CP violation with B mesons and thereby understand why the universe contains so much more matter than antimatter," said Caltech physicist David Hitlin, the spokesman of the BaBar collaboration.

But it will require the observation of millions of B mesons before the scientists involved can reach any definitive conclusions about this elusive phenomenon. That is why so many physicists from around the globe have come to work on the B Factory, which promises to generate these intriguing particles in profusion. The first published results are anticipated by next year. SR

