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LETTERS

Synchrotron X-rays from a B Factory

Faye Flam provides an insightful perspective (News, 27 Aug., p. 1111) into the competition between Cornell and Stanford universities for a B factory, an accelerator that promises to yield answers to such fundamental questions as why the universe contains more matter than antimatter.

The review committee, commissioned by the Department of Energy and the National Science Foundation and headed by Stanley Kowalski of the Massachusetts Institute of Technology, was asked to evaluate the relative merits of the Cornell and the Stanford B factory proposals. To help ensure a level playing field, a set of conditions was laid down, one of which was to limit the evaluation to only those factors that contributed to B-quark production. The possibility of using these machines as synchrotron radiation sources was explicitly excluded from the evaluation process. However, the Cornell proposal as initially submitted to the National Science Foundation explicitly included a synchrotron radiation facility, CHESS (Cornell High Energy Synchrotron Source) B, as an integral part of the larger accelerator project.

In contrast with the SLAC (Stanford Linear Accelerator Center) B factory design and the implications of SLAC director Burton Richter's remarks, the synchrotron radiation produced by the Cornell storage rings would not all go to waste: it has been, and would continue to be, put to good use providing extremely intense x-ray beams for relatively little additional cost and in a manner that does not compromise the design for particle physics purposes.

The novelty of the B factory as a synchrotron x-ray source results from circulating currents of up to 1 or 2 amperes of electrons and positrons at energies of 8 and 3.5 gigaelectron volts, respectively, which could be used as a high-flux x-ray source after the installation of passive, permanent magnet assemblies called undulators and wigglers into the storage rings. Having more than 10 times the design current of present third-generation high energy x-ray sources such as the Advanced Photon Source and the European Synchrotron Radiation Facility, this new facility would deliver at least an order of magnitude more photons to flux-limited experiments. In the high energy photon regime it would deliver about 100 times more x-rays than the present CHESS laboratory, which has, for the past 13 years, successfully served a community of about 500 scientists each year from diverse university, corporate, and governmental laboratories that are involved in research with x-rays (and not high energy particle physics). The incremental cost to upgrade CHESS for the B factory project would be close to $15 million. Operating costs would be roughly the same as the present CHESS facility ($2.5 million a year).

In today's lean times, it makes good sense to consider funding a B factory project that could make available to the scientific communities an extraordinary x-ray source at a modest scale and which would greatly advance the quality of x-ray experimentation by tapping the power of a new world-class accelerator.

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In his letter of 17 September (p. 1505), Burton Richter, director of the Stanford Linear Accelerator Center (SLAC), lists some of the technical risks involved in the Cornell design for a B factory. In fact, there are technical risks inherent in both designs. The B factory review panel concluded in its report that both proposals were workable and that in each case the engineering challenges would be met and overcome. It also concluded that the cost of the Cornell proposal—including the cost of the collider, the detector, commissioning, and operation—would be significantly lower than that of the SLAC proposal.

It is to be hoped that the decision of where to build the B factory will be based on this unbiased report rather than on the statements of laboratory directors like Richter and me.

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Biodiversity Entreaty

D. L. Burk *et al.* paint a grim picture of the future of the U.S. biotechnology industry if the United States complies with the Biodi-