SSC-240

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Bottom Collider Detector (BCD)

An Intermediate- and Low-P_t Detector for the SSC

BCD Collaboration[1]

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The BCD Detector

1. A large dipole magnet with field transverse to the beams. This can be thought of as the limit of two large-aperture forward spectrometer magnets as the distance between them goes to zero. As a bonus, good central coverage is obtained.

2. The **Silicon Vertex Detector**, with silicon as close as 1.5 cm to the beams.

3. The **Tracking System**. It is too costly to perform all tracking in silicon detectors, so these must be supplemented with tracking chambers, composed of straw-tube detectors in the current design.

4. The **Very Small Angle Fiber Tracking System**, a fast tracking system designed to measure tracks at rapidities beyond those covered by the main detector. It provides a minimum bias trigger, luminosity measurements, and a fast method of determining the longitudinal location of the primary vertex to within $\pm$ 1 cm.

5. **Ring-Imaging Čerenkov Counters** and **Time-of-Flight Counters** to provide identification of charged pions, kaons, and protons.

6. **Transition Radiation Detectors** to provide identification of electrons vs. pions, in conjunction with item 7.

7. An **Electromagnetic Calorimeter**, to complete the electron identification and to provide a trigger and tag on the decays $B \rightarrow eX$.

8. A **Muon Identification System** via instrumented steel, covering $|\eta| > 1$.

9. A **Fast Trigger** to reduce the event rate by a factor of 50 before the event information is moved off the detector.

10. A **Barrel-Switch Event Builder** capable of organizing the data streams from 10^5 events per second into individual events.

11. An online **Processor Farm** of about 10^6 MIPS (= 1 TIP) capability to provide the higher-level triggering needed to reduce the event rate to 1000 per second for archival storage.

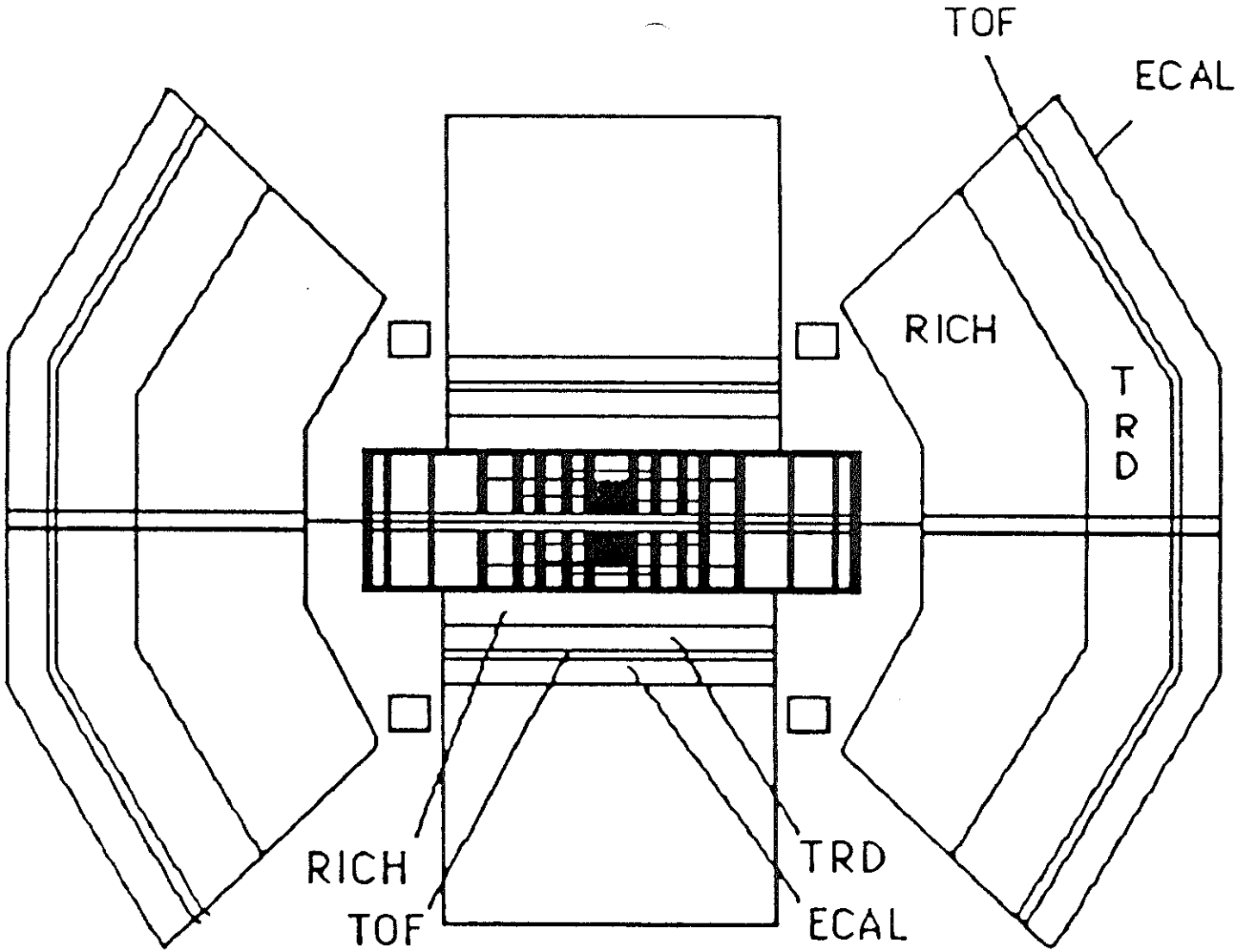

Figure 4: GEANT model of the central part of a B-physics experiment; (without the muon identifier).

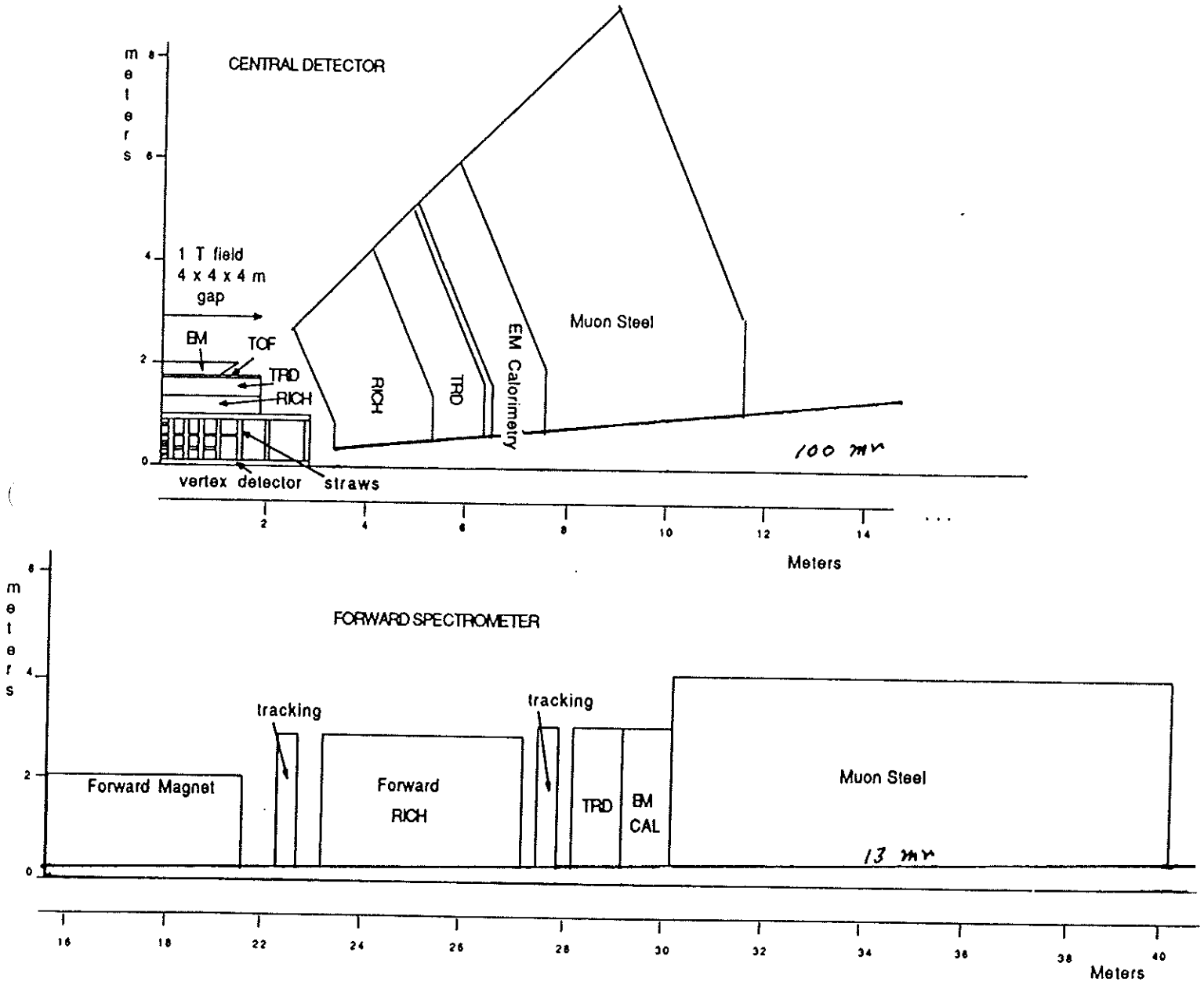

Figure 2: Quadrant view of a B-physics experiment at the SSC.

SSC Subsystem R&D Proposals

Members of the BCD collaboration have contributed to the following SSC Subsystem R&D Proposals:

1. *Proposal to SSC Laboratory for Research and Development for a Parallel Computing Farm,*

   L.D. Gladney, N. S. Lockyer, K. Ragan, *U. Penn,*

   J. G. Heinrich, K.T. McDonald, *Princeton U.,*

   Justin Rattner, *Intel Scientific Computers.*

2. *SSC Subsystem R&D Proposal: Detectors for the Identification of Electrons, Pions, Kaons and Protons,*

   D.F. Anderson, J.G. Morfin, *Fermilab,*

   M. Adams, *U. Illinois/Chicago,*

   Y. Onel, *U. Iowa,*

   M.S. Alam, A. Deogirikar, W.M. Gibson, *S.U. New York,*

   D. Kaplan, G. Kalbfleisch, *U. Oklahoma,*

   D. Marlow, *Princeton U.,*

   A. Lopez, A. Mendez, J. Palathingal, *U. Puerto Rico/Mayaguez,*

   B. Hoeneisen, C. Jimenez, C. Marin, R. Pasmay, *U. San Franciso de Quito,*

   D. Errede, M. Sheaff, *U. Wisconsin,*

   P. Karchin, A. J. Slaughter, *Yale U.*

3. *Proposal to the SSC Laboratory for Research and Development of a Straw-Tube Tracking System,*

   C. Lu, J.G. Heinrich, K.T. McDonald, *Princeton U.,*

   R. Burnstein, H. Rubin, *Illinois Institute of Technology,*

   D.T. Hackworth, J. Szedon, *Westinghouse.*

4. *SSC Detector R&D Proposal: Development of Technology for Pixel Vertex Detector,*

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   D. Pellett, *U.C. Davis,* F. Augustine, W. Flaugh, G. Kramer, C. Pfeiffer, K. Reyzer, D. Wiggins, J. Wingterberg, *Hughes Aircraft,*

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5. *A Microvertex Detector for B-Physics at the SSC,*

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   A.J. Slaughter, E. Wolin, *Yale U.*