

P5 Town Hall at SLAC



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Topics for BNL Participation in the CERN FCC-ee Feasibility Study (remote)

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The FCC-ee project under study at CERN is a circular lepton collider operating at beam energies from 45 to 175 GeV [1]. Careful optimization of the Interaction Region (IR) magnet designs and the Machine Detector Interface (MDI) present critical challenges to insure the best possible FCC-ee physics performance [2]. We believe that US laboratories can and should play an important role in strengthening the FCC-ee IR design team. In this note we give, as one example, how the Magnet Division (MD) at BNL has both significant experience and technical capabilities to contribute to the FCC-ee Feasibility Study effort. The FCC-ee IR design work will build upon previous lepton collider projects such as those for BEPC-II, ILC and SuperKEKB and is synergistic with the work on the lepton-hadron colliders namely HERA-II and the current EIC project at BNL; BNL MD had/has major IR magnet and MDI responsibilities with every one of these projects. For instance, BNL's Direct Wind magnet production technique was used to manufacture a wide variety of compact superconductor coils, both correctors and main magnets, to meet exacting space and harmonic field content requirements [3,4]. For the MDI, BNL MD has always been closely involved in setting functional requirements and implementing magnet, cryostat, support and the cryogenic cooling and current lead solutions which continues with the EIC IR design. Close inspection of the present FCC-ee IR baseline highlights areas where state-of-the-art solutions are required, and we believe that by building upon our experience with both the EIC and SuperKEKB we can make major original contributions to the FCC-ee Feasibility Study efforts in concert with other US laboratories.

References

[1] Future Circular Collider Study. Volume 2: The Lepton Collider (FCC-ee) Conceptual Design Report, preprint edited by M. Benedikt et al. CERN accelerator reports, CERN-ACC-2018-0057, Geneva, December 2018. Published in Eur. Phys. J. ST.

[2] M. Koratzinos, A. Blondel, A. Bogomyagkov, S. Sinyatkin, M. Benedikt, B. Holzer, J. Van Nugteren, F. Zimmermann and K. Oide, "The FCC-ee interaction region magnet design," arXiv preprint arXiv:1607.05446, 2016.

[3] B. Parker, "Direct Wind Magnets for the ILC, SuperKEKB, FCC-ee and the Electron-Ion Collider," contribution to 65th ICFA Advanced Beam Dynamics Workshop on High Luminosity Circular e+e- Colliders (eeFACT2022), INFN Frascati, September, 2022, at URL: <https://agenda.infn.it/event/21199/contributions/173697/attachments/96336/13264>

[4] B. Parker, et. al., "BNL Direct Wind Superconducting Magnets," Contribution 4FO-6 to MT22, Marseille, France, September, 2011.

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