

Proposal to create a “Center for Future Collider Studies/Physics” at Fermilab

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- Fermilab is the dedicated “HEP” Lab in the US. Therefore, it is important that the Lab plan for a future at the Energy Frontier (EF) and lead the U.S. community!
- The Fermilab Future Colliders Group (FCG) and the Snowmass EF advocated strong US engagement in FCC-ee, and to advance Collider R&D to prepare to host a future collider (Muon Collider) at Fermilab. The 2024 P5 has strongly endorsed this vision.
- We see that proto-collaborations are already being formed around specific machines and potential experiments, in Europe and in the US. Despite many disclaimers, DOE has given its (admittedly weak) encouragement to these efforts, which typically involve BNL.
- While Fermilab is a natural home for all these efforts and should take the lead in at least some of them, it concerns us that we have not stepped forward with a plan and so are in a weak position. We fear that if we wait, by the time we do step up the community will have bonded to these other efforts at BNL and elsewhere. Realignments are unpleasant, and so often the first “host” to step forward ends up as the de facto choice.
- We feel that Fermilab needs to declare its determination (beyond mere “interest”) to lead such efforts in the US and quickly develop a plan to follow in the next few years (when resources may still be scarce). The plan will presumably focus on design and R&D for some new machines and experiments, which will require mainly some accelerator physicists and some experimental physicists who can pick up some of the accelerator work. This has happened many times in the past.
- As to which projects to engage -- the collider community at Fermilab is interested in following the P5 plan of working on the FCC-ee for the relatively near term and the muon collider as a more distant vision. The work on the FCC-ee would be mainly in the design of experiments, but accelerator work with the guidance of CERN as host lab should be considered. One critical aspect of the muon collider work would be to design a cost-effective demonstration program that would determine the feasibility of the machine. Beyond that, as part of the specification of the machine, the Fermilab group would study what would be possible on the Fermilab site.
- These two projects, perhaps combined with some additional synergistic projects that were discussed at Snowmass and in the P5 report, could be the focus of a “Center for Future Collider Studies/Physics”, based at Fermilab. A task force

should be created and charged to get this started soon, within, say, the next few weeks. (Or better yet if the Lab management creates it with details to be worked out in the next few weeks.)