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# Future Test Beam and Irradiation Needs

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Detector Working Group Meeting

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# Test Beam – Where we are currently

- For the last few years, FTBF has supported on average 15 experiments and over 200 users from
  - Neutrino: LArIAT, Hadron production, ProtoDUNE
  - Precision Science: Mu2e, gm2
  - LHC: LHCb, CMS, ATLAS
  - General R&D: Future collider work
  - EIC/RHIC: sPHENIX, general R&D
- Next 2 years, CERN test beams will be down.
  - Anticipate an uptick in LHC related test beams
  - Could possibly use FTBF Committee to help with scheduling decisions

# What We Currently have

- 2 beamlines
- MTest
  - 120 GeV primary protons
  - 60-2 GeV secondary mixed beam (positive and negative polarity)
  - Infrastructure, including beamline instruments like telescope
- MCenter
  - Secondary beamline
  - 2 Tertiary beamlines
  - Mostly used for neutrino experiments
    - Could we expand?

# Issues to Address

- Telescope integration is complicated
  - This is a focus this year, working with Ryan and Lorenzo to make it easier
  - Had have success this year getting more users to run the telescope themselves
  - Not enough room by the telescope, but we'll address that this summer
- Deadtime on our other detectors
- Cherenkov is good, but has old controls and is very picky about changing pressures
- Wire chambers are sufficient, but would it be better to use something else?

# Future Projects

- Multiyear campaigns from both ATLAS and CMS
  - ATLAS Pixels
  - CMS everything
- Hadron production using emulsion targets
  - Focused on neutrino experiments, but looking for more collaborators outside
  - Need a magnet (small, possibly a permanent magnet)
  - Multiyear campaign using MTest and MCenter.
- Neutrino efforts:
  - Magnetized liquid argon (Jolly Green Giant)
  - Gaseous TPC (Early Career proposal)

# Future Projects

- Muon test beams
  - Two proposals from Precision science group: MUonE, LDMX-mu (https://indico.fnal.gov/event/16806/contribution/2/material/slides/0.pdf)
  - Need very different energies (150 GeV, 15 GeV), but both could use the muons at the FTBF in MTest
  - These are likely before 2025
- Electron beam
- Tagged neutron beam (have had some requests for this)
- Ultra low energy tests for DM experiments

# Irradiation Test Area (ITA)

- Very high demand from LHC users
- Use the MTA facility

- Table from ITA kick off meeting

**Table 1: Beam parameters to be expected at the DUT (Device Under Test)**

| Beam Specifications | Min | Max |
|---|---|---|
| Beam Size (±3σ) at DUT | 1 cm | 5-7 cm |
| Beam Divergence (±3σ) at DUT | 0.1 mr | 1 mr |
| Number of Proton/pulse | $0.3\times10^{12}$ | $7.5\times10^{12}$ |
| Pulse Duration | 2 μs | 50 μs |

# ITA

- Goal is try to get something ready for the fall
- Beam is H-
  - Polled some users, for many this isn't a problem
  - More important to get this up and running now
- Can run under the Test Beam limit
  - Won't have to negotiate more time
- Will likely run sporadically
  - Not necessarily every day all day like FTBF
- Working on cost and manpower issues now