Compact Experiments & Early-Career Opportunities

with FASER, FPF, and FLArE (FPF)

Smaller experiments with shorter development periods allow greater impact and more variety of experimental physics-related activities

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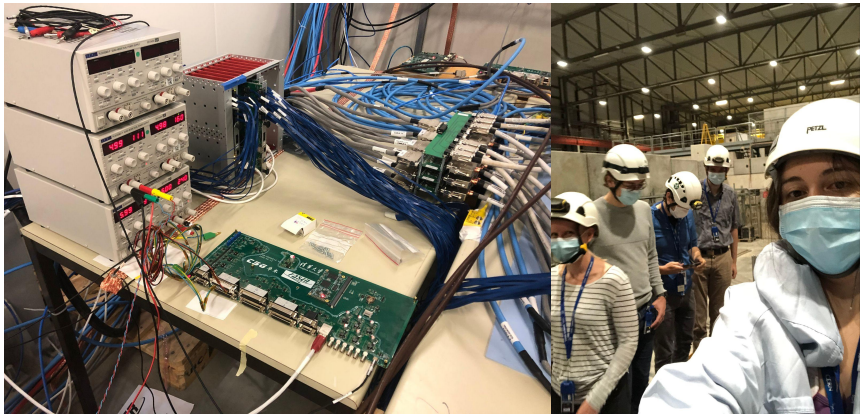
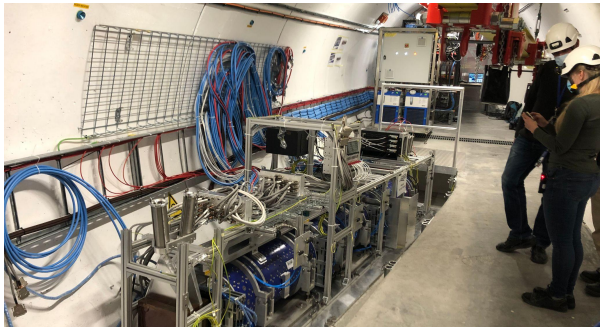
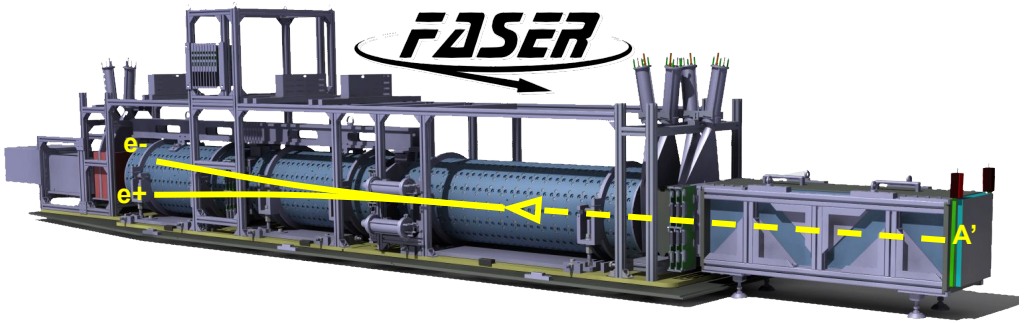
Opportunities with FASER

- **For**w**A**rd **S**eaRch **E**xpe**R**iment - installed and collecting data in Run 3 from collisions in ATLAS interaction point
- Driven by early-career researchers, guided by experienced PI
- **2023 Results:** Collider neutrino detection, dark photon exclusion
- FASER Timeline *(2017-Present)* < PhD student tenure *(4-6 years)*
- Many students participated in commissioning, monitoring, collecting data, and analysis.

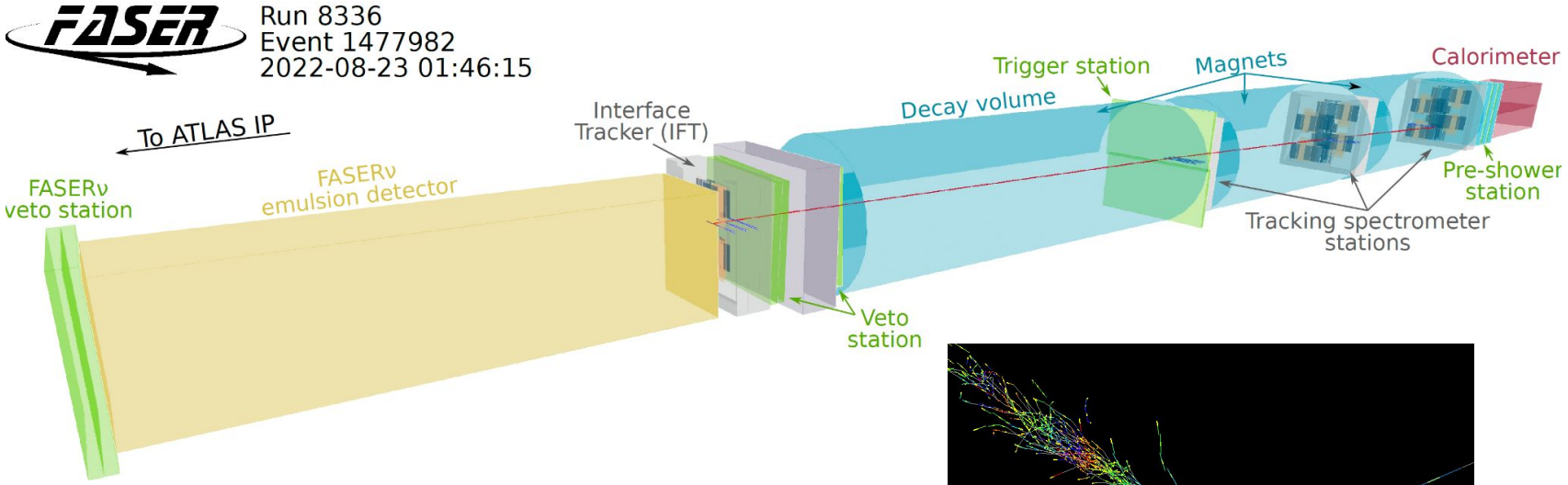


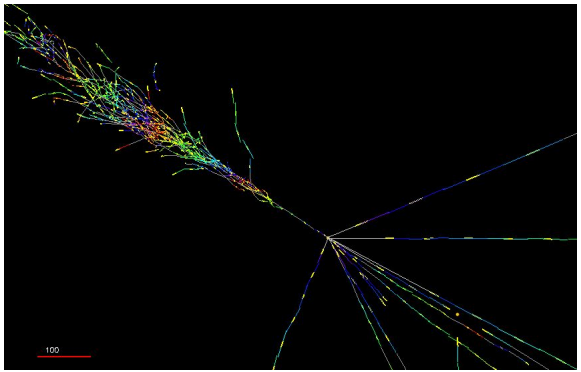
Commissioning set up (top left) and part of the test beam team, including early career members (top right). FASER installed in TI12 (bottom left) and 3D model with yellow dark photon signal (bottom right)





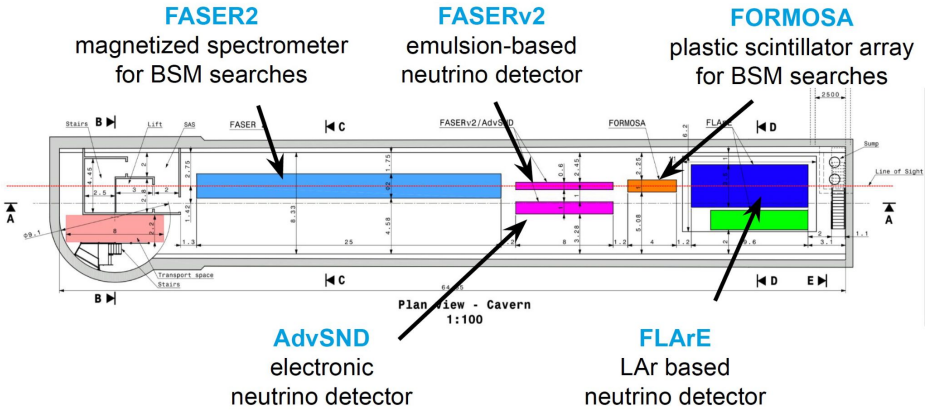
Opportunities with FASER





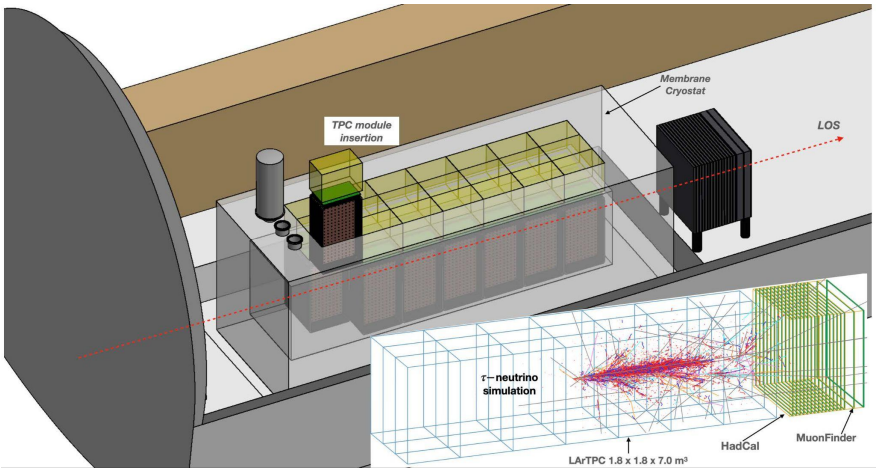
Opportunities with FPF

- The **F**orward **P**hysics **F**acility (FPF) is a proposed scientific facility hosts a suite of detectors in the forward region of the ATLAS interaction point
  - Guaranteed SM progress from ~a million neutrinos at ~TeV energies
  - Rich program of BSM physics searches
- A possible timeline (With the experience from the pathfinder experiments like FASER)
  - Build FPF during long shutdown 3 from 2026-2028
  - Install detectors in 2029
  - Start data taking soon after the beginning of of Run 4
- It provides good opportunities for junior researchers in a relative short timescale



FLArE at FPF

- Segmented liquid argon TPC
  - 10 tons fiducial mass
- Neutrino detection, light dark matter searches
- Wide dynamic range: ~10 MeV to hundreds of GeV
- R&D is helped by the considerable investment in the field (ICARUS, MicroBooNE, SBND, DUNE, …)
  - High spatial and kinematic resolution
  - Effective trigger in the presence of large muon backgrounds



Promising yet also challenging
Rich physics program with “free” particle sources
Perfect platform for early career scientists