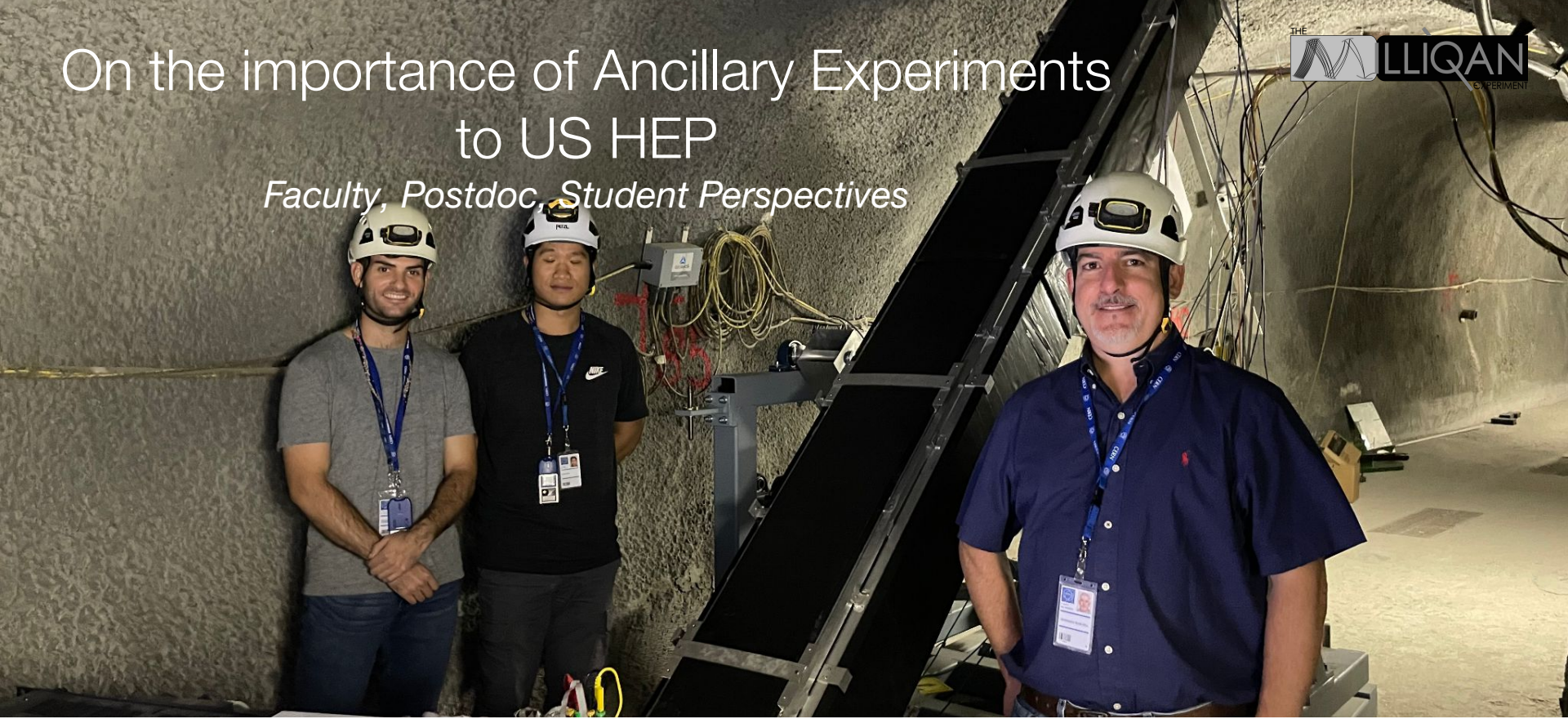
On the importance of Ancillary Experiments to US HEP

Faculty, Postdoc, Student Perspectives



Open Mic Contribution BNL P5 Townhall

Mike Carrigan (OSU), Teresa Du (Chicago), Chris Hill (OSU), Neha Santpur (UCSB)

April 2023

“Cheap” Extension(s) of HEP Program

- milliQan was formed in 2014 from a small group of interested collider physicists as a low-cost way to extend LHC physics reach … it is currently recording Run 3 data!
- “Simple” experiment to “quickly” address interesting developments in the field (e.g. dark sectors)
- Since then other ancillary LHC experiments proposed by many, some realized already e.g. FASER
    - *For HL-LHC and any future collider experiments, planning to include these from the start of program makes good scientific (and economic) sense*

Science was my original goal … but the opportunities afforded students/postdocs maybe the most enduring legacy

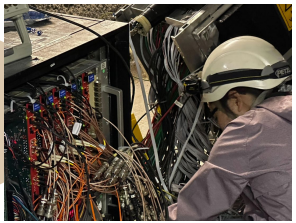
Prof. Chris Hill
(milliQan co-spokesperson)

These projects are great for students

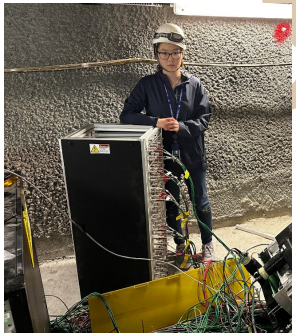
- Training on all aspects of HEP experiments from design to commissioning to operation and analysis
- Being able to take runs and work on the detector provides great context for any simulation or analysis work

I have gotten more hands on experience with every part of running the experiment

Mike Carrigan
(OSU grad student)



It's so rewarding to go from drafting and machining to testing and installation



Tianjia (Teresa) Du
(Chicago grad student)

Possible to work on many parts of an experiment and fully understand them

- Learn about complex subsystems like triggering/DAQ in an simpler context
- New ideas can be implemented immediately without large bureaucracy

Also very attractive for postdocs

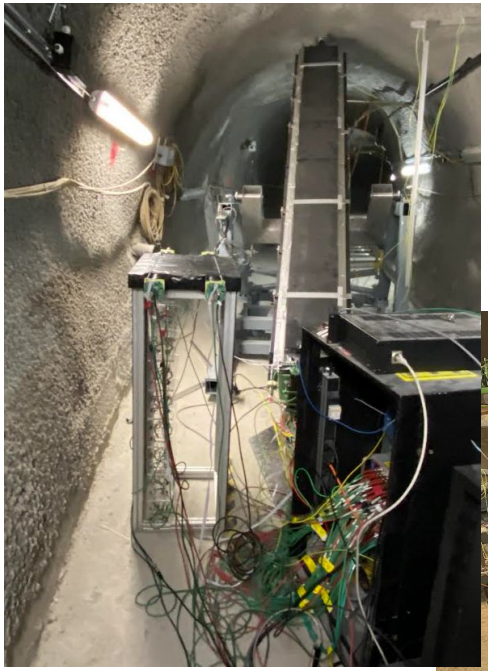
- Provides ability to have critically significant impacts on experiments (and shape direction of sub-field)
  - *“Easy” visibility - relatively good faculty job prospects compared to larger HEP experiments*
  - *Large impact on detector design, implementation, data acquisition and data analysis*
    - *I will be spending summer 2023 at CERN building MilliQan slab detector*
  - *Provides a better work satisfaction by complimenting my work on the CMS experiment*

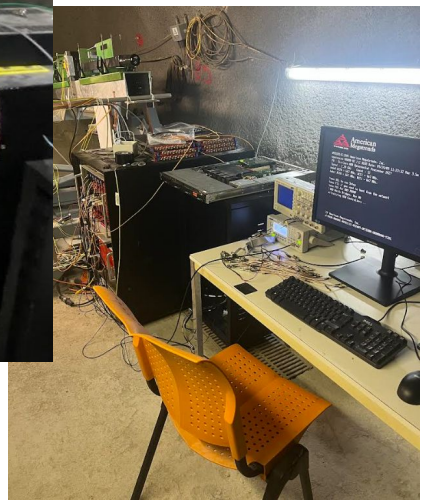
Milliqan provides a unique opportunity to do exciting particle research with a small-scale detector

Neha Santpur (UCSB postdoc)

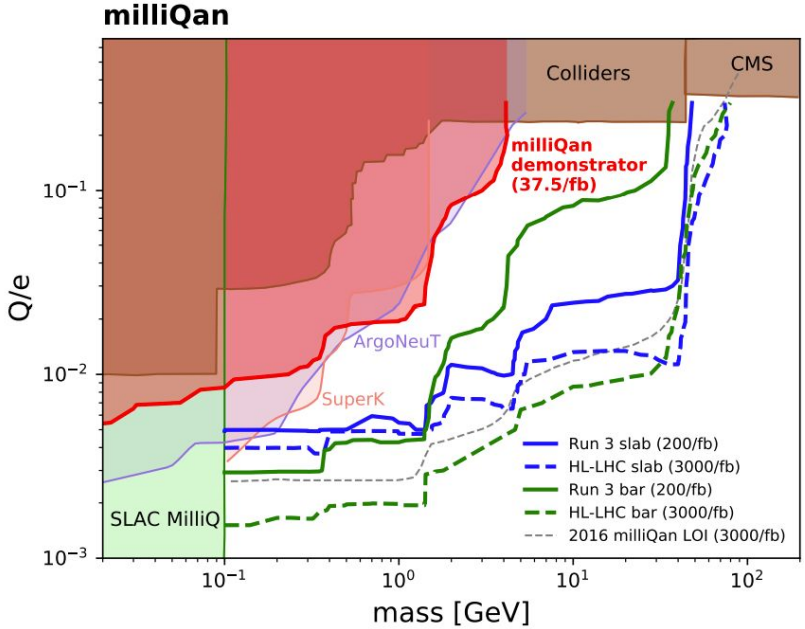
Summary of main points

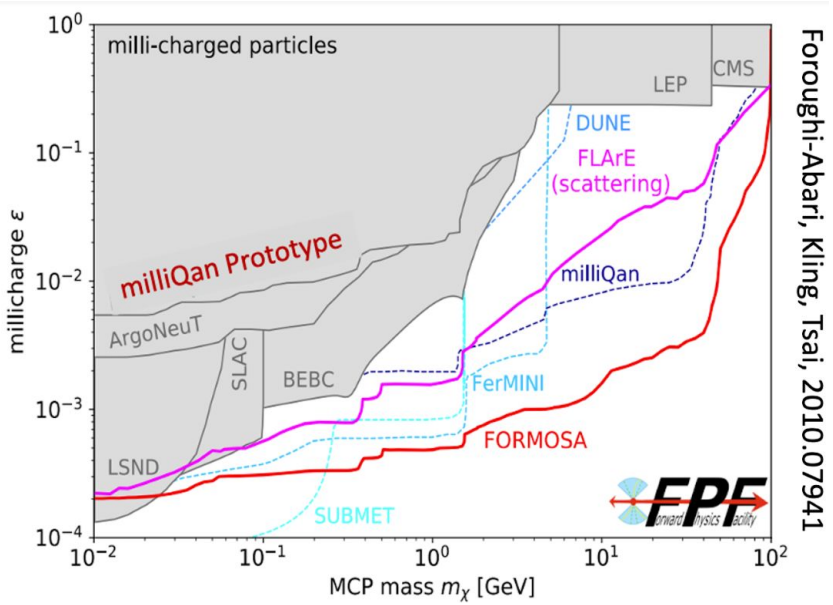
- Small scale experiments such as MilliQan provide a unique opportunity to conduct particle physics research in smaller collaborations
- We urge P5 committee to prioritize increased funding and support for small-scale yet high impact particle detectors (e.x. FPF)
- Continued and increased funding for these experiments in addition to the support for future detector R&D will help retain critical expertise in the field while decisions on future colliders is being made
- Design for future large facilities should leave designated room in anticipation of ancillary experiments





Backup





https://arxiv.org/pdf/2104.07151.pdf