

LANL Express of Interest in the EIC SVT DSC

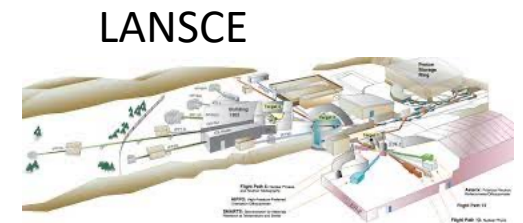
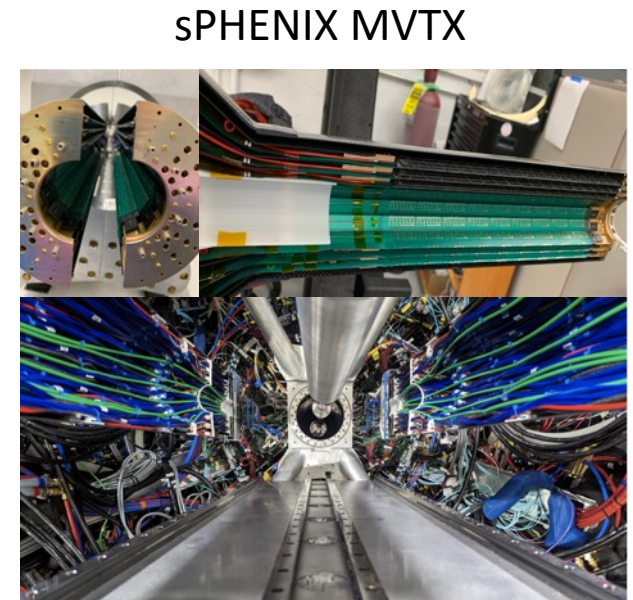
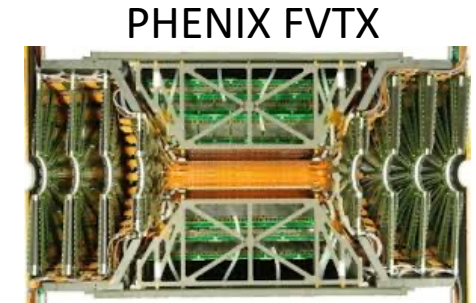
Xuan Li on behalf of the LANL team

Introduction to the LANL team

- **Contact person:** Ming Liu
- **Colleagues who have been involved in the EIC project detector R&D:**
 - Walter Sondheim is in the eRD111.
 - Xuan Li is in the eRD113.
- **Colleagues who plan to contribute to the EIC SVT:**
 - Ming Liu (senior scientist)
 - Sensor evaluation, endcap SVT design, streaming readout and AI-ML application for the EIC SVT
 - Lead DOE FOA AI-ML sPHENIX/EIC projects (2022-2025) and will apply for new LANL LDRDs
 - Walter Sondheim (senior engineer) and Eric Renner (engineer)
 - mechanical support and cooling system design of the EIC SVT from 2022.
 - Xuan Li (scientist)
 - MAPS R&D of the EIC SVT endcap disks, SVT endcap design and developments, and detector/physics simulation studies from 2022.
 - Cesar da Silva (scientist)
 - Real time analysis and streaming readout development.
 - Matt Durham (scientist), Kun Liu (scientist) and Hugo Pereira Da Costa (scientist): interested, details TBD
 - Postdocs.
 - ...

Background and existing resources at LANL

- The LANL team has successfully led the PHENIX FVTX silicon detector design, construction and operation (\$5M LANL LDRD, in addition to funding from DOE) from 2009 to 2016.
- The LANL team has successfully led the MAPS based (ALPIDE/ITS-2) MVTX detector design and construction for the sPHENIX experiment (\$5M LANL LDRD, and \$6M construction funding from DOE) from 2016-2023. Ming Liu as the project manager and leader. The sPHENIX experiment will start to take data in 2023.
- LANL has provided \$5M (LDRD) funding for the EIC forward silicon tracker detector development from 2019 to 2022 and the LANL team is applying for new LDRD funding for the EIC related R&D. Xuan Li as the Co-PI to lead the experimental aspects.
- Two silicon R&D labs has been setup at LANL for the MAPS detector R&D, AI/ML real time implementation and readout developments.
- The LANL LANSCE facility (high intensity 800MeV proton beam) can provide irradiation tests for detector prototypes.
- DOE FOA AI-ML projects: EIC streaming readout and AI-ML application at EIC (2022-2025)



LANL's plan for the R&D phase

- The LANL team is willing to play a major role in
 - The MAPS sensor R&D for the endcap disk SVT.
 - Design and production of the mechanical support and cooling system of the silicon barrel and endcap detectors, along with their overall integration. NOTE: the scale of this work will depend on funding, see below.
 - Streaming readout and AI-ML application
- Depending upon the funding and resource situation, we could also contribute to
 - Bench and beam tests to characterize the sensor performance.
 - Detector simulation studies to implement detailed layout of the endcap disks and evaluate the tracking performance.
 - ...
- Seek new funding for R&D
 - LANL LDRD to support key EIC SVT R&D
 - Stitched ITS-3 like disk sensor development
 - Mechanical support and cooling design to minimize the detector material budget
 - Joint EIC project detector (eRD) fund with other institutions

LANL's plan for the construction phase

- The LANL team is willing to play a major role in collaboration with other institutions:
 - Design and build the endcap SVT.
 - Design and build the mechanical support frame and cooling system for the endcap SVT.
 - The SVT detector installation and commissioning
 - The detector operation, calibration and maintenance
 - Online/offline detector monitoring system development.
 - Real time data processing algorithm developments.
 - Overall integration