Echelon2 Site In Taiwan

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Taiwan

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Echelon2 Site In Taiwan

- EIC-Taiwan contributions to the collaboration - including EIC computing
  - Endorse the Echelon2 site in Taiwan for the computing test or production activities
    - Definite funding support is yet confirmed before 2028
- ASGC will coordinate the deployment and development of Taiwan Echelon2 site
  - Building the capacity for a reliable and efficient Echelon2 site from the pilot phase and understanding the bottleneck
    - Participating the technology development is possible - for computing and operation efficiency
    - OSG software stack deployment experience: deployed for IGWN site in 2023
    - Site architecture: federated or one single site
  - Resource scale: O(100)CPUCores and O(100)TB disk storage at ASGC in the starting phase is possible
    - e.g., Intel Xeon E5-2650L v4@2.2GHz *2/node, 5GB RAM/core
  - Strategy
    - Shared network, and dedicated CPU and storage
    - Starting from legacy GPU might be manageable (such as 1080ti or P100)

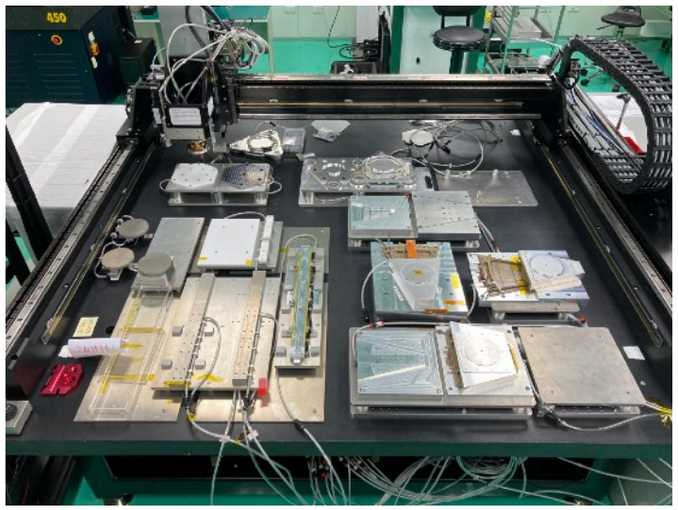
Building RI Capacity for Accelerating Discovery & Innovation

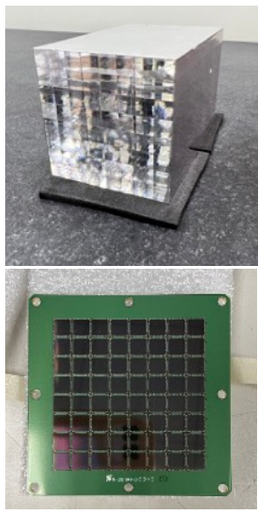
- ASGC is operating the scientific computing core facility in Taiwan, as an computing research infrastructure in Academia Sinica with reliability and efficiency
  - Integrating data, algorithm and computing according to the needs of user communities
    - Supporting computing by cluster (Slurm), WebUI and JupyterLab with Ceph storage pool
  - Federating distributed resources based on the core technology of WLCG, such as PanDA, Rucio, EOS, and AAI, in addition to openstack, K8S, etc.
  - Acting as WLCG Tier-1 Center (2005 - 2023) and supporting multi-disciplinary scientific computing in Taiwan since 2006
- Resource Status (till Aug. 2025): > 98% reliability
  - CPUCores: (Sci Cloud, WLCG) = (4,352, 650) + spare (2208) Cores, (+ 1920 cores in Q4 2025)
  - GPUBoards: A100(24), L40S(4), 4090(16), V100(48), 3090(56), P100(16), (+ 24x RTX Pro 6000 GPU in Q4 2025)
  - Disk Storage: 20PB, (+ 3 PB in Q4 2025), 10PB Tape Libs
  - ATLAS T2: dedicated 650 CPUCores (30K HS06) and 5 PB Disk
  - Finished 5M CPU jobs and 54K GPU jobs in 2024 (not including WLCG)
  - Networking
    - Taiwan island-wide R&E backbone will be upgraded to 400Gbps from 1 Jan 2026
    - non-LHCONE (general Internet) bandwidth is shared will all AS institutes
      - 10Gbps to JP, 10Gbps to SG, 10Gbps to Geant (and CERN), operating by ASNet
      - 10Gbps to US (StarLight) and will be upgraded to 100Gbps from 1 Jan 2026 (TWAREN)
    - LHCONE is connected with 5Gbps, supported by TWAREN and ASNet

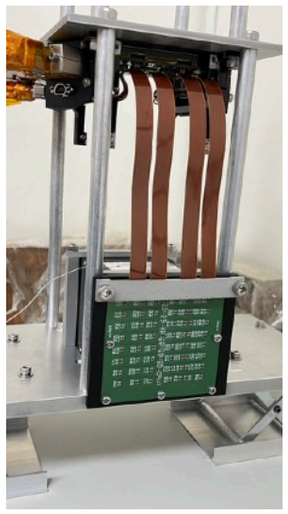
EIC-Taiwan's Participation in the EIC Program

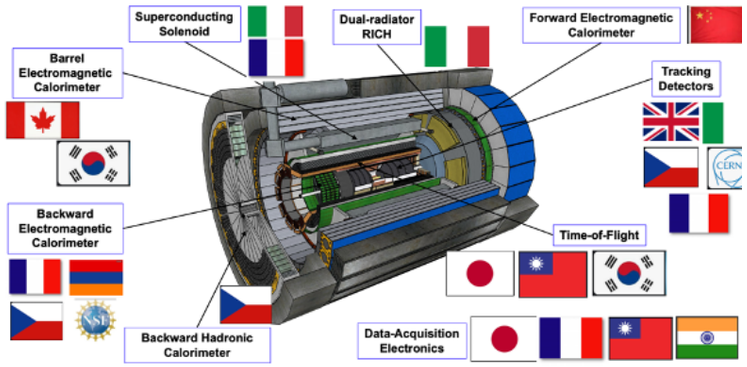
- EIC-Taiwan comprises four experimental teams from Academia Sinica, National Taiwan University, National Central University, and National Tsing Hua University. Several theoretical groups, including those from National Yang Ming Chiao Tung University and Chung Yuan Christian University, have also expressed strong interest in collaborating with the experimental teams.

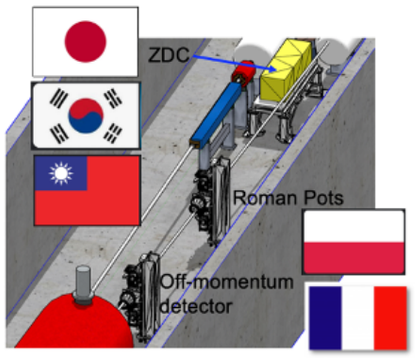
- Supported by the Taiwan Instrumentation and Detector Consortium, which is funded by the NSTC, we have been actively involved in the development of sub-detectors (Time-of-Flight and Zero Degree Calorimeter) and computing systems for the ePIC experiment.











- **Time-of-Flight (TOF):**
  - We aim to establish production of AC-LGAD silicon sensors in Taiwan.
  - The Taiwan Silicon Detector Facility will be leveraged to support future involvement in sensor module assembly.
  - We plan to contribute to sensor characterization, the development of associated electronic components, and AC-LGAD sensor manufacturing.
  - We have been collaborating with Purdue University on the design and development of mechanical support structures.

- **Zero Degree Calorimeter (ZDC):**
  - Lead tungstate ($PbWO_4$) crystals coupled with SiPMs serve as the baseline design for the electromagnetic calorimeter.
  - LYSO crystals read out by avalanche photodiodes (APDs) are being developed as a potential upgrade option for enhanced performance.
  - Detector prototypes were constructed in Taiwan as part of the R&D effort.
  - Beam tests were conducted in Japan to evaluate the detector performance under realistic conditions.

- **Grid Computing:**
  - The Academia Sinica Grid Computing Center has been actively involved in the ePIC computing project, contributing its expertise in distributed computing and data management.

- **Electron injector:** NSRRC is interested in contributing to the EIC electron injector project.