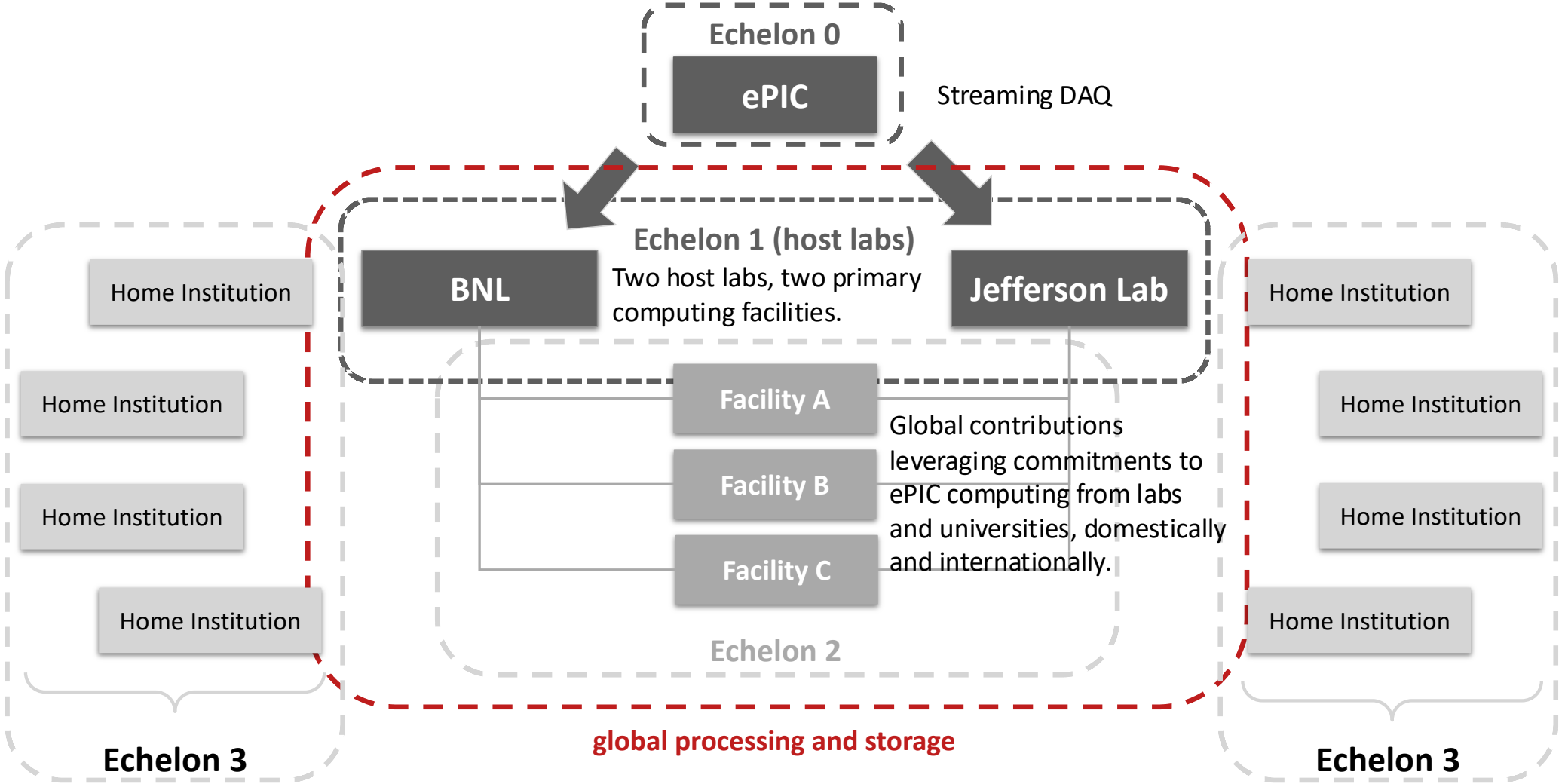
# The ePIC Streaming Computing Model




Supporting the analysis community *where they are* at their home institutes, primarily via services hosted at Echelon 1 and 2.

# Computing Use Cases and Their Echelon Distribution

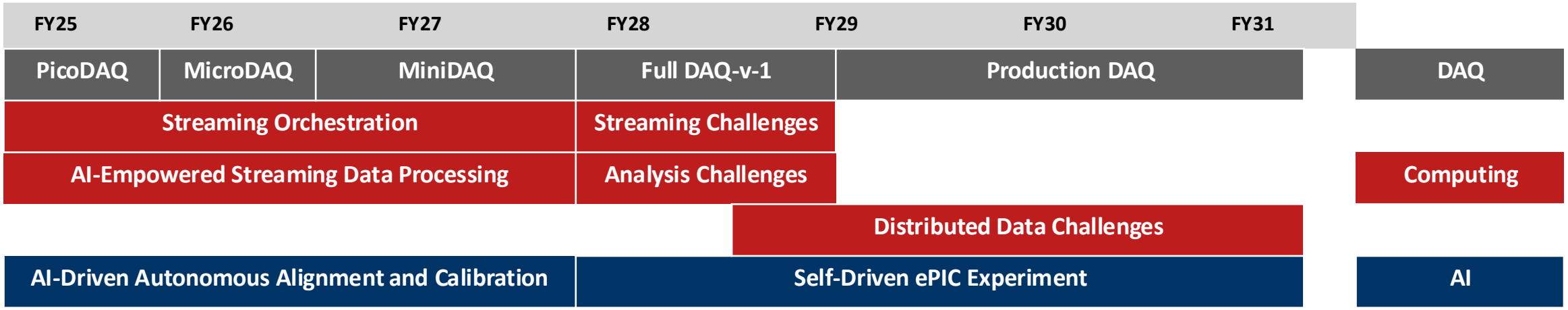
| Use Case | Echelon 0 | Echelon 1 | Echelon 2 | Echelon 3 |
|---|---|---|---|---|
| Streaming Data Storage and Monitoring | ✓ | ✓ | | |
| Alignment and Calibration | | ✓ | ✓ | |
| Prompt Reconstruction | | ✓ | | |
| First Full Reconstruction | | ✓ | ✓ | |
| Reprocessing | | ✓ | ✓ | |
| Simulation | | ✓ | ✓ | |
| Physics Analysis | | ✓ | ✓ | ✓ |
| AI Modeling and Digital Twin | | ✓ | ✓ | |

**Substantial role for Echelon 2 in preliminary resource requirements model**

| Assumed Fraction of Use Case Done Outside Echelon 1 | |
|---|---|
| Alignment and Calibration | 50% |
| First Full Reconstruction | 40% |
| Reprocessing | 60% |
| Simulation | 75% |

- **Echelon 1** sites uniquely perform the **low-latency streaming workflows** consuming the data stream from Echelon 0:
  - Archiving and monitoring of the streaming data, prompt reconstruction and rapid diagnostics.
- Apart from low-latency, **Echelon 2** sites fully participate in use cases and **accelerate** them:
  - Tentative resource requirements model assumes a **substantial role for Echelon 2**.
  - **Priority**: Capabilities and resource requirements for Echelon 2 resources developed jointly with the community.
  - **Priority**: Establishing EIC International Computing Organization (EICO):

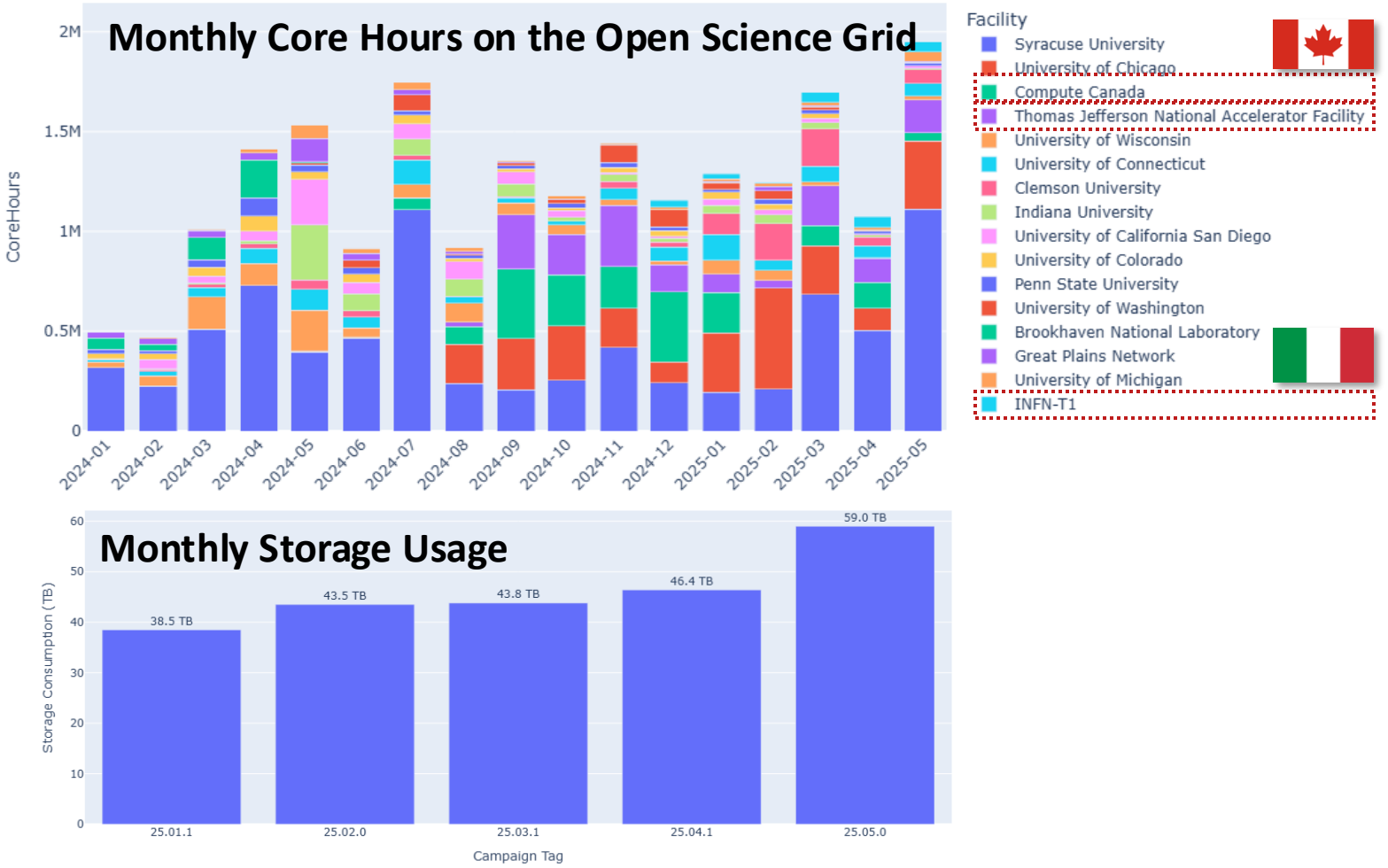
# Timeline




- **Compute-Detector Integration**:
  - Joint deliverables between **DAQ** and **computing** to develop integrated systems for detector readout, data processing, and ultimately physics analysis.
  - **Key role of AI**: Empowering data processing and enabling autonomous experimentation and control.

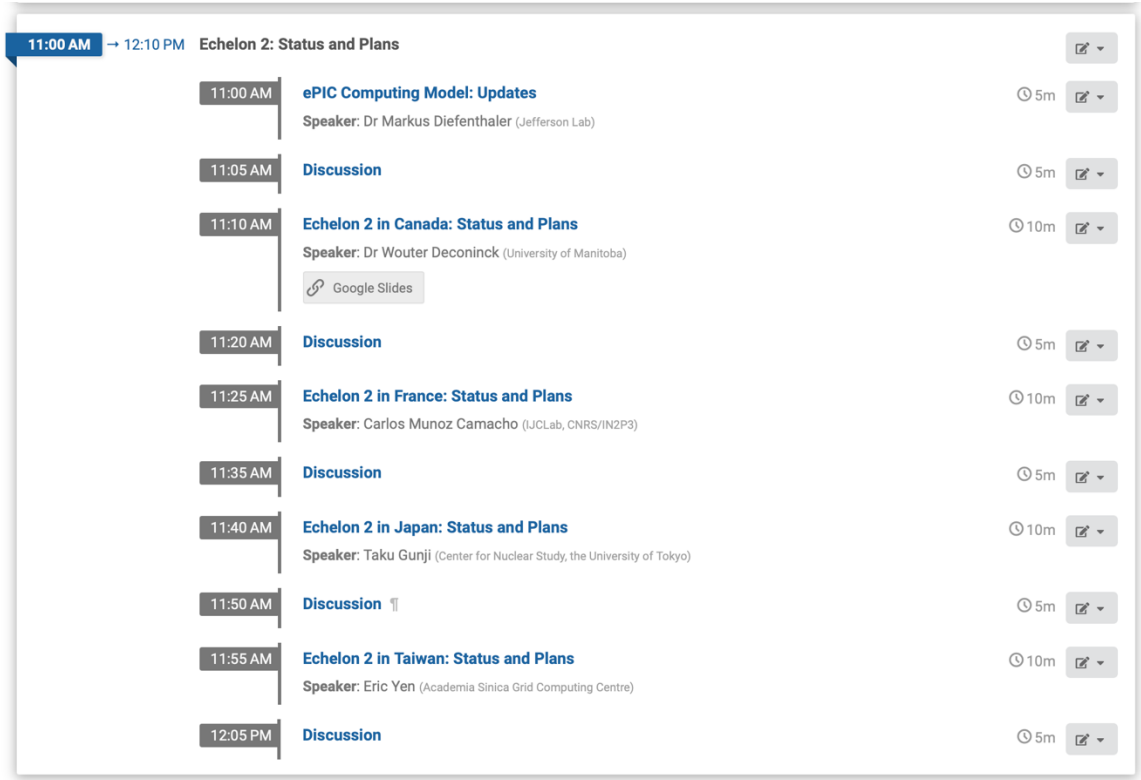
# International Contributions to Compute and Storage for ePIC Simulations

- Over the past year, monthly simulation campaigns consumed approximately 15 million core hours on the OSG, generating over 500 TB of simulation data.
- These simulations serve as the standard for detector and physics studies for the preTDR and also the Early Science Program.
- These included compute resources from international partners.




**Supporting the monthly simulation campaigns with compute and storage resources is an effective way to help build the ePIC computing infrastructure and facilitate early data and analysis challenges.**

# Agenda




- **I am grateful to the representatives of all EICO member countries** who have contributed material for today's meeting in preparation for the **ePIC Software & Computing Review.**
- In addition to today's presentation, I have received input regarding the **Echelon 2 status and plans in Italy and the United Kingdom**.
- Due to conflicts with other meetings, this that material cannot be presented during today's session.
- The received material will still be included in the **documentation for the Software & Computing Review**.