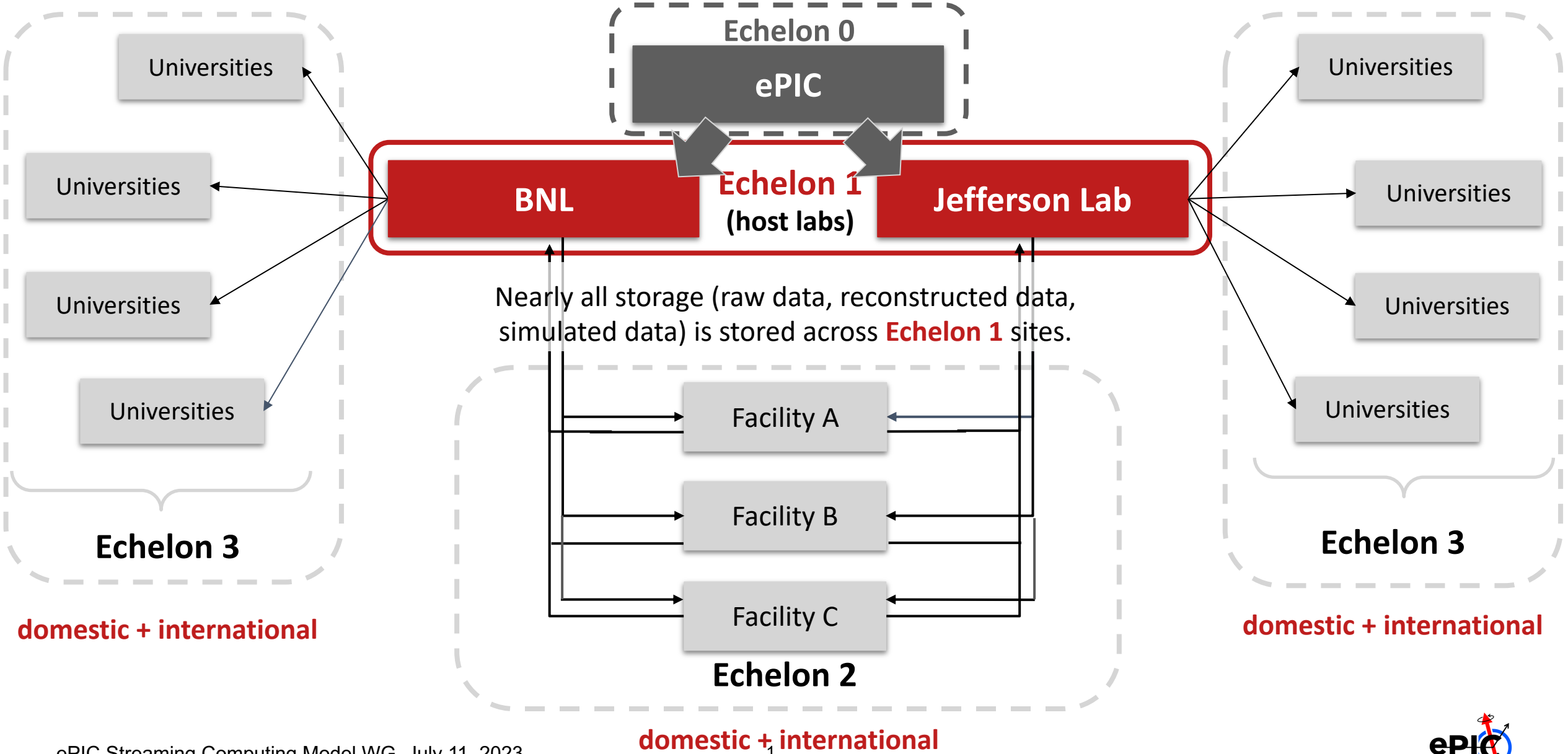
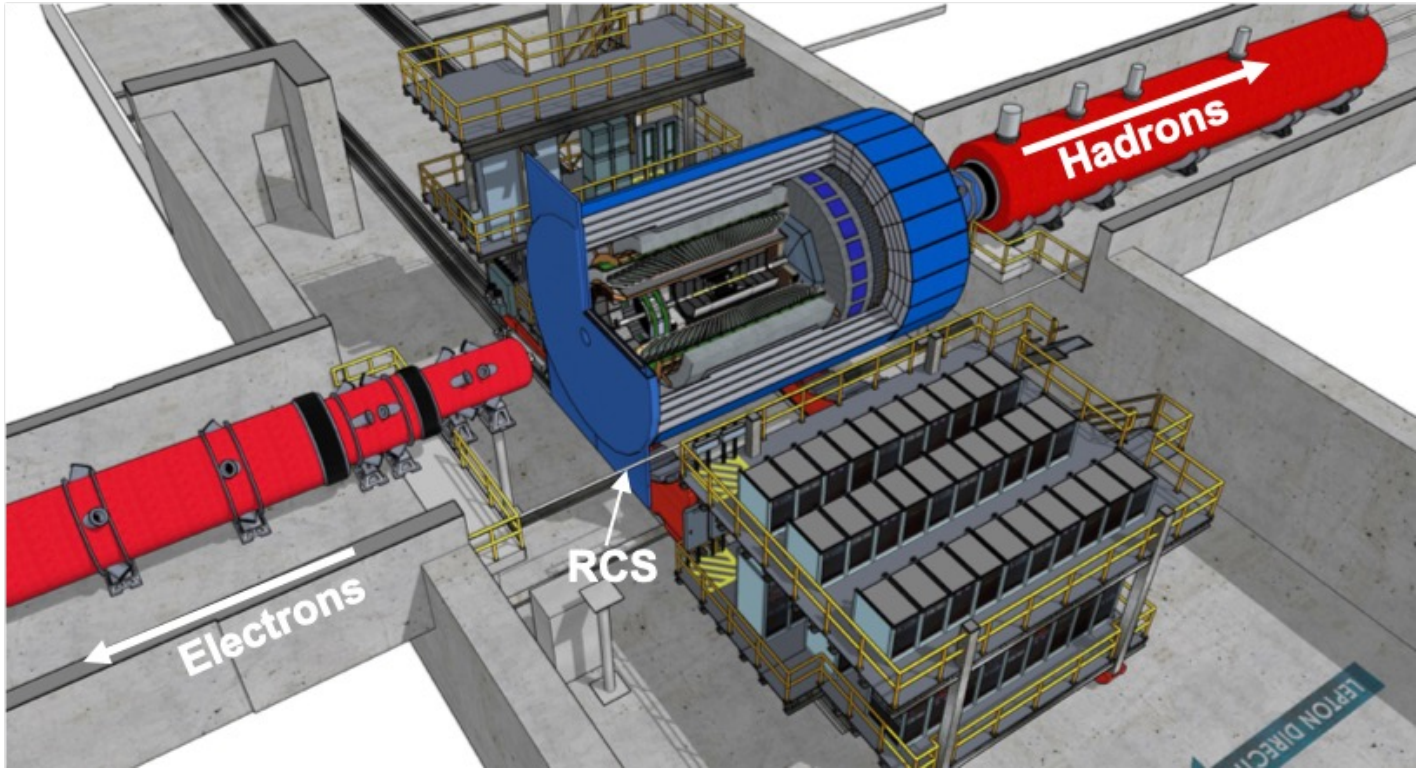
ePIC Distributed Computing Model



Optimize Physics Reach

Integrated interaction and detector region (+/- 40 m)

Get ~100% acceptance for all final state particles, and measure them with good resolution. All particles count!



Lessons learned in the NHEP community: **Develop computing model hand in hand with the detector.**

Compute-Detector Integration

Extend integrated interaction and detector region into detector readout (electronics), data acquisition, data processing and reconstruction, and physics analysis.

Compute-Detector Integration to Maximize Science

- **Problem** Data for physics analyses and the resulting publications available after O(1year) due to complexity of NP experiments (and their organization).
  - Alignment and calibration of detector as well as reconstruction and validation of events time-consuming.
- **Goal** Rapid turnaround of data for physics analyses.
- **Solution** Compute-detector integration using:
  - AI/ML for autonomous alignment and calibration as well as reconstruction in near real time,
  - Streaming readout for continuous data flow and heterogeneous computing for acceleration.

Data Flow: **100 Tbps** → **10 Tbps** → **0.1 Tbps**

ePIC Computing Model Discussion

Context:

- ePIC has been asked to present an **update on the computing model at the EIC RRB** in December, describing how international partners can contribute to computing for the EIC.
- The ePIC Streaming Computing Model WG and SCCs will guide the **discussion on the computing model**.
- In our discussions, we would like to the involve the ePIC collaboration at large as well as the host labs and other computing experts worldwide.
- Prior to the EIC RRB in December, the host labs will organize a review of the computing model. The review will be likely on October 19 or 20.
- We aim to publish the ePIC computing model and have a draft ready for the review.

Kickoff the Discussions:

- We will discuss today about unique requirements of **computing models that feature streaming**.
- We will review next week the **status of the ePIC Computing Model**.
- We will discuss the event and data sizes from Echelon 0, the **streaming DAQ system** of the ePIC Detector.
- We will hear **perspectives from the international community** (work in progress).
- **Focus: EIC RRB in December and the role of international partners in computing.**