

BigPanDA Experience on Titan for the ATLAS Experiment at the LHC



U.S. DEPARTMENT OF
ENERGY

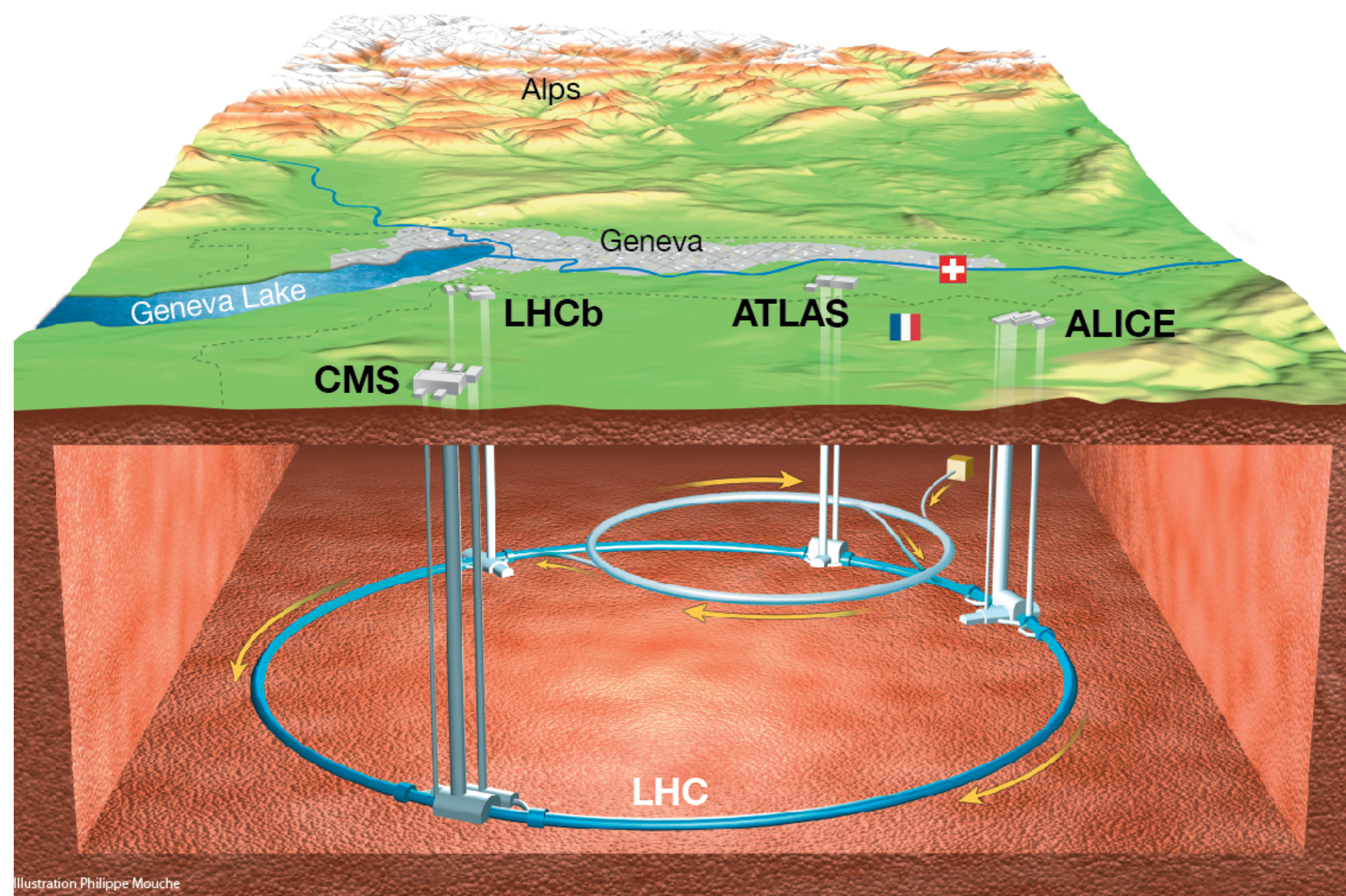


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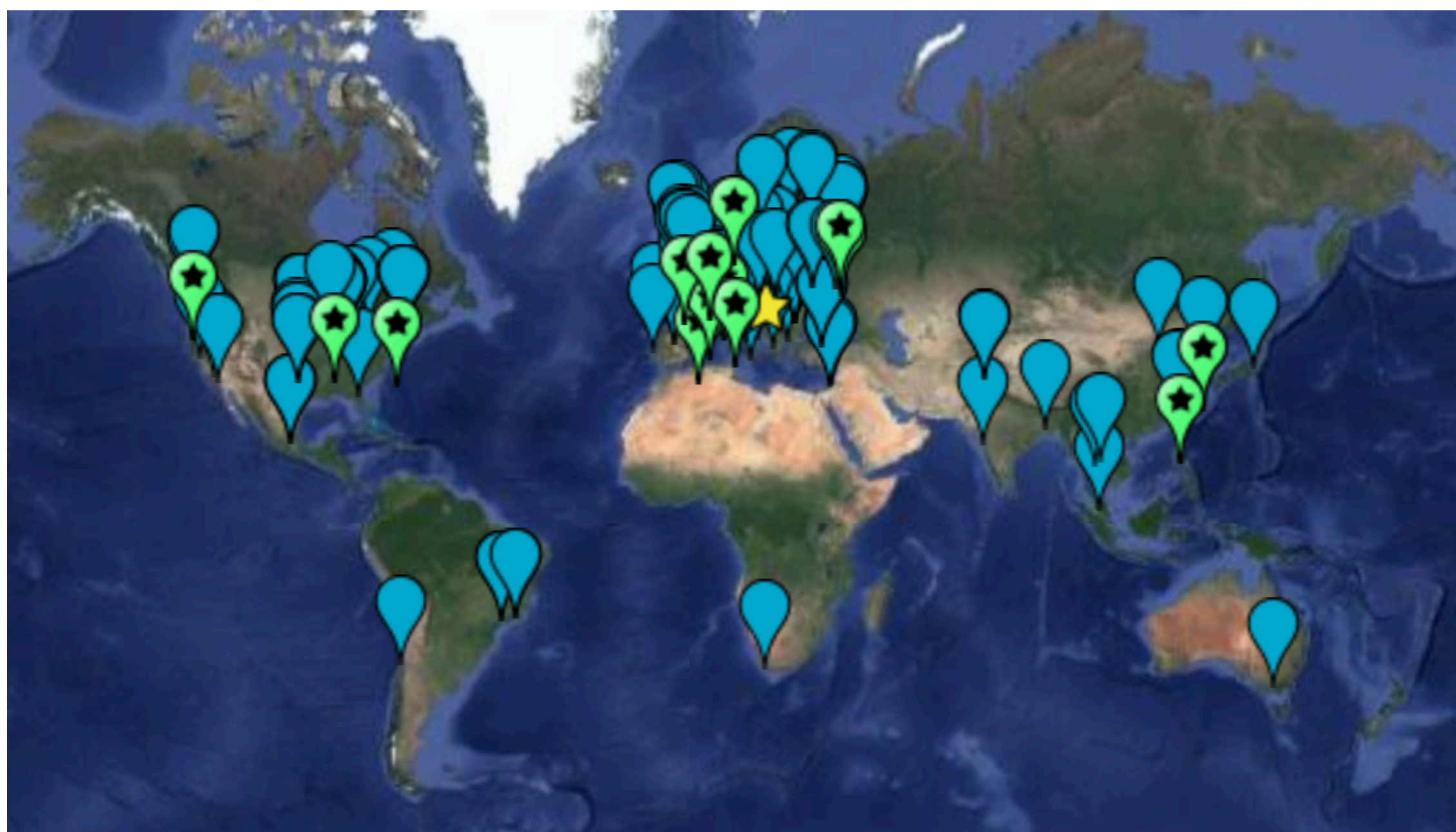
The Large Hadron Collider

- ❑ The Large Hadron Collider (LHC), operates at the CERN Laboratory in Geneva, Switzerland to explore the fundamental particles and forces that shape our universe.
- ❑ ATLAS (A Toroidal LHC Apparatus) is one of the four major experiments at the LHC and among those credited for the discovery of the Higgs Boson. It is one of the largest scientific collaborations of all time.



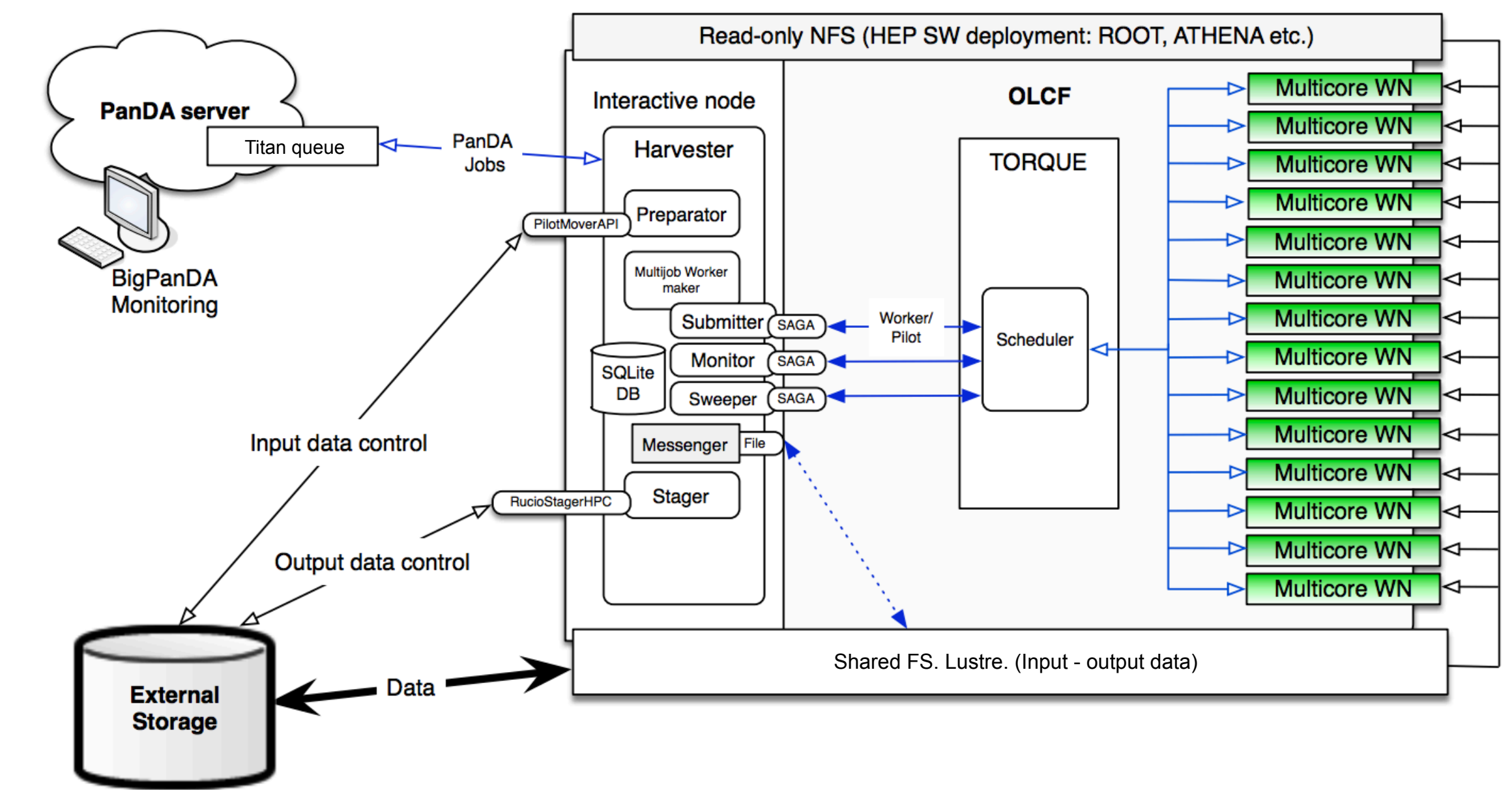
PanDA prior to BigPanDA

- ❑ PanDA (Production ANd Distributed Analysis) is a distributed workload management system written in Python which was designed for grid computing, the model for LHC computing until recently.
- ❑ The Worldwide LHC Compute Grid (WLCG) includes resources from more than 150 sites, typically comprised of more than 300,000 CPU cores.

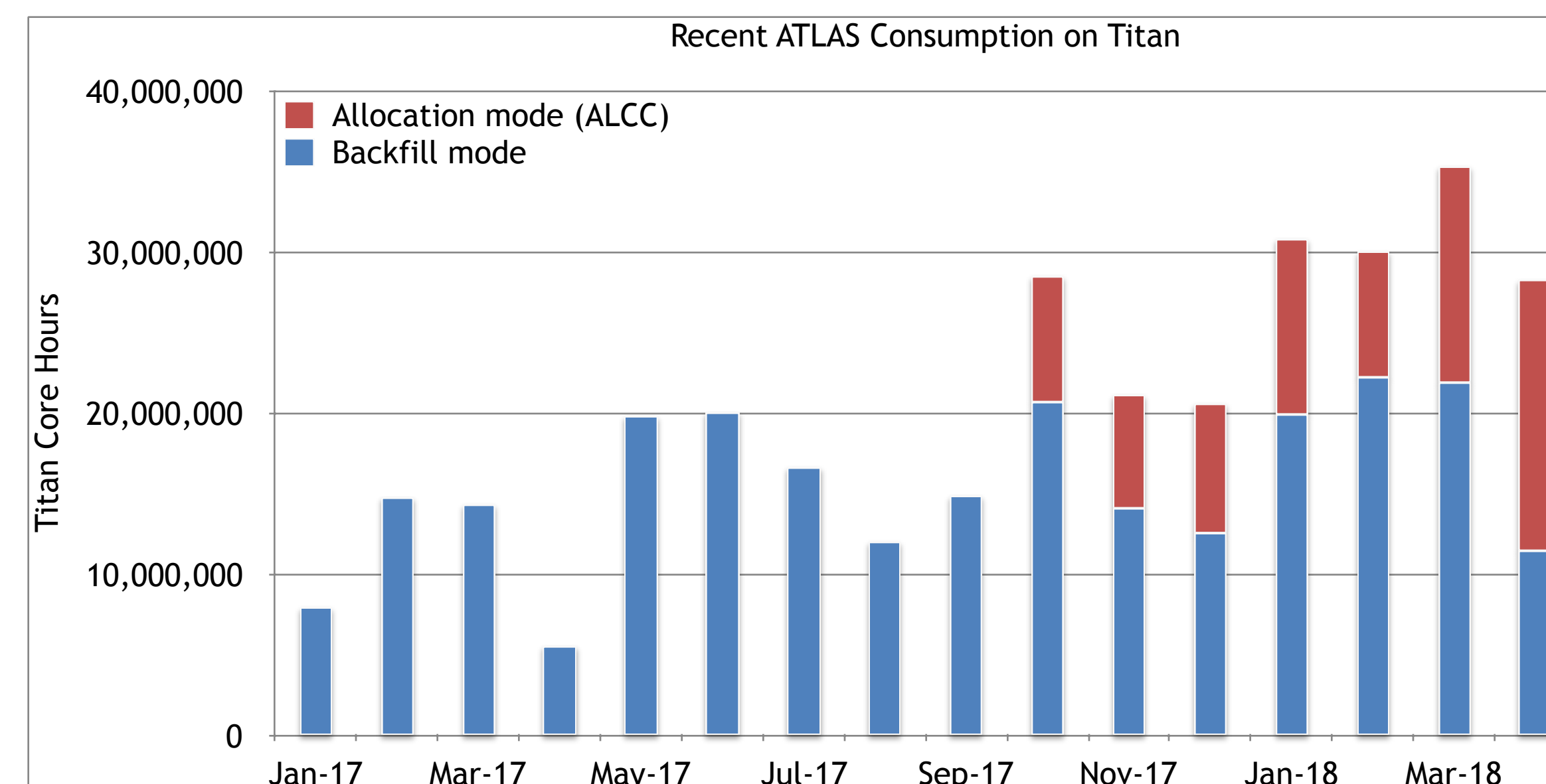


BigPanDA: Extending PanDA to Incorporate Cloud and HPC Resources

- ❑ BigPanDA extends PanDA's current computing model to harness cloud resources as well as opportunistic resources from supercomputers.
- ❑ BigPanDA can use traditional allocations, such as from the ASCR Leadership Computing Challenge (ALCC).
- ❑ BigPanDA can also harness unused core hours on HPCs by taking advantage of "backfill mode", thanks to the innovative Harvester service.
- ❑ BigPanDA can also manage workloads for other projects, but currently only ATLAS uses it in production.
- ❑ ATLAS now uses Titan in official production, as well as other HPCs such as Cori at NERSC, Theta at ALCF, and SuperMUC at LRZ in Germany.



Impact of Titan on ATLAS



- ❑ Titan was the first U.S. HPC to be harnessed by PanDA, and it is currently used exclusively for simulation.
- ❑ In April 2018, Titan performed 4.5% of the total computing consumed by ATLAS, including 7.7% of the computing consumed by simulations.
- ❑ Since January 2016, ATLAS has consumed 248M core hours by using backfill, which represents a 3.89% increase in utilization of Titan.
- ❑ In April 2018, ATLAS was responsible for 7.5% of the core hours consumed on Titan.

Impact of BigPanDA on Titan

