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CTLab4ET: Updates on computing laboratory to support technology evolution for Einstein Telescope

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CTLab4ET (Computing Technology Laboratory for ET) was established under the ETIC (Einstein Telescope Infrastructure Consortium) project to provide the Einstein Telescope (ET) collaboration with a dedicated environment—nicknamed "TechZoo"—for testing and benchmarking emerging computing technologies. With ET's operational horizon extending roughly a decade into the future, it is mandatory to keep pace with rapid advances in hardware and software to design a robust, scalable infrastructure for gravitational-wave data analysis. By late 2025, a first version of the ET computing model is anticipated, emphasizing the need for a laboratory capable of exploring novel technological

architectures during the ET Preparatory Phase and for ET R&D in general.

Procurement of the initial hardware resources was completed last year, establishing the foundation for Tech-Zoo cluster. The laboratory will be inaugurated on April 14, 2025, and current efforts are focused on finalizing an access model that ensures transparent allocation of diverse resources—from CPU- to GPU-accelerated nodes—for a wide range of R&D activities. While CTLab4ET is funded by ETIC, it is committed to maintaining a close interplay with the "HPC Bubbles" initiative being developed under the TeRABIT project, thereby fostering synergies in high-performance computing at scale. A Kubernetes-based orchestration layer underpins the cluster, enabling the integration of heterogeneous hardware into both cloud-native and traditional workflows.

This contribution provides an overview of the laboratory's hardware infrastructure and the evolving software framework designed to make the cluster readily available to the collaboration, ensuring a dynamic testbed that can adapt to the evolving demands of ET data processing and foster innovative computing solutions.

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