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SAR-GRAV underground laboratory (Sardinia): engineering challenges and key solutions.

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The SAR-GRAV underground laboratory is located in SOS-ENATTOS mine area (Lula Mining District, Sardinia) and was designed to host small-to-medium-sized experiments, intended as individual experiments of fundamental physics and geophysics, and prototypes of equipment for larger experiments, such as future gravitational wave detectors. The laboratory, which will host the ARCHIMEDE experiment funded by INFN in the first instance, considered a seed for the design the larger infrastructure dedicated to the Einstein Telescope. The key components of the laboratory area a surface building which currently hosts the first phase of the Archimede experiment and in the future will host the control room and auxiliary laboratory areas and an underground cavern located at about 200 m below the ground level, which will host the liquid nitrogen cryostat and a white room for laser applications. Two access ramps will connect the lab to the existing Sos-Enattos mine tunnels and a service shaft will connect the laboratory with the surface for ventilation and the passage of the installations.

The talk focuses on the main engineering challenges and key solutions that led to the preparation of the feasibility study to design the underground facility which included first mapping and surveying and geological and geotechnical characterization, etc.) and then technical, economic, safety and environmental aspects to setup the feasibility study for the laboratory.

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