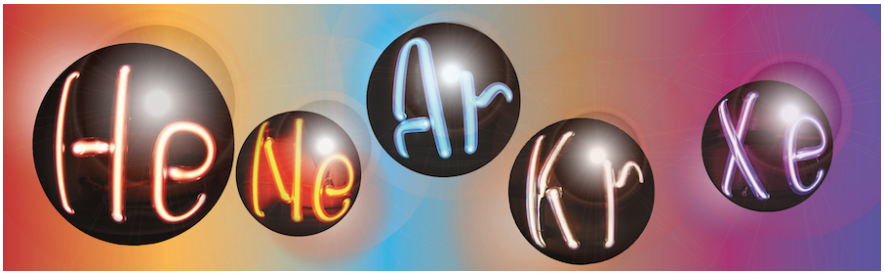

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Proto-0: a prototype for validating key technologies of the DarkSide-20k experiment and beyond.

Tuesday, 21 October 2025 16:20 (20 minutes)

Within the DarkSide Program, which aims at the direct detection of Weakly Interacting Massive Particles (WIMPs), the DarkSide-20k experiment is currently under construction at LNGS. It is based on a next-generation dual-phase liquid argon Time Projection Chamber (TPC). The Proto-0 project, currently running at the Dark-Matter facility in Naples (Italy), was designed to demonstrate the viability of key design aspects proposed for DarkSide-20k, such as light readout using low-background Photodetector Units (PDUs) based on cryogenic SiPMs and the use of innovative bulk materials.
Moreover, in the Proto-0 TPC the geometry can be modified during operation, for studying the formation of the secondary signal in the gaseous phase under different boundary conditions. This aspect is critical for instance to optimize the setting of a dual-phase liquid-argon TPC that aims at low-mass WIMPs detection.In this talk, we present the Proto-0 detector along with its main ancillary systems, together with the key results obtained and the lessons learned.

Primary author: CARAVATI, Mauro (Gran Sasso Science Institute (GSSI))

Presenter: MATTEUCCI, Giuseppe (Università degli Studi di Napoli Federico II)

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