

First data from the prototype of DarkSide-20k in Napoli

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DarkSide-Proto0 (Proto0) is an experiment developed within the DarkSide-20k project, a dark matter direct detection experiment that aims to hunt for WIMPs using a two-phase argon time projection chamber (TPC). In preparation for the future DS-20k experiment, Proto0 focuses on investigating and optimizing the production of the ionization signal (S2) in two-phase argon TPCs and validating many of the novel technologies featured in the DS-20k detector on a smaller scale. To achieve this, Proto0 is equipped with a compact TPC designed to accommodate two PDUs, the 20x20 cm² SiPM-based photon counters developed for DS-20k. The main feature of the Proto0 detector is its flexible TPC design, with independently moving components during operation. This enables an optimization study of S2 formation in relation to geometrical factors and electrical properties. The results obtained from Proto0's scientific program will help fine-tune the DS-20k TPC design and contribute to a broader understanding of the engineering behind future two-phase experiments. The experiment is currently located at the cryogenic laboratory of Unina/INFN Napoli, where it is collecting data using a specially designed cryogenic setup, complete with argon condensation, recirculation, and purification loops.

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