

Low radioactivity Argon for DarkSide-20k Dark Matter search experiment

The DarkSide-20k (DS-20k) experiment is a 20-ton active argon detector which plans to operate radio-pure underground argon (UAr) for dark matter direct searches. A major worldwide effort is on-going in order to procure the radio-pure argon required for this experiment. The Urania project will extract and purify the UAr from the CO₂ wells at the Kinder Morgan Doe Canyon Facility located in Cortez (USA) at a production rate of ~100 kg/day. It will be necessary to make a chemical and radiological purification of the UAr before deployment into the LAr TPC of DS-20k. The Aria project will serve to purify the UAr using a cryogenic distillation column, called Seruci-I, located in Sardinia (Italy). The ultimate goal of Aria is to implement an upgraded column, Seruci-II, able to process about 150 kg/day of argon and to achieve an additional ³⁹Ar depletion factor between 10 and 100. Assessing the purity of UAr in terms of ³⁹Ar is key for the physics program of DS-20k. DART is a small (~1 liter) chamber that will measure the depletion factor of ³⁹Ar in UAr. The detector will be immersed in the LAr active volume of ArDM (LSC, Spain), which will act as a veto for gammas stemming from the detector materials and from the surrounding rock. Data taking is planned for 2019. In this talk, I will review the status and prospects of the UAr projects for DarkSide20K.

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