

## Low radioactivity Argon for rare event searches

The DarkSide-50 two-phase liquid argon (LAr) detector has been searching for weakly interacting massive particle (WIMP) dark matter for more than three years, and during the last two and a half years has been successfully operating the detector with argon that was extracted from underground CO<sub>2</sub> wells in Cortez, Colorado in the USA. This source of argon is shielded from cosmic rays entering Earth's atmosphere, and thus has a concentration reduced by more than a factor 1000 of the cosmogenically produced isotope of <sup>39</sup>Ar that beta decays with an endpoint energy that causes the beta spectrum to entirely cover the LAr WIMP search region. This talk will focus on the details of two new projects called Urania and Aria. Urania aims to extract up to 250 kg/day of UAr from the same source of gas as that used to extract the UAr for DS-50. Aria will then further purify by cryogenic distillation in a 350 m tall column the extracted UAr to produce >35 tonnes of detector grade UAr for use in a 20-tonne fiducial volume detector called DarkSide-20k, set to begin operations at the beginning of the next decade. Both projects require industrial scale plants with potential applications outside basic research.

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