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The ArDM Experiment

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The Argon Dark Matter (ArDM) experiment is based on a ton-scale double-phase liquid argon detector, currently in the commissioning phase at CERN. The scientific goal is the direct search of WIMP Dark Matter through detection of nuclear recoils induced by WIMP scattering on an Ar nucleus.

The active mass is 850 kg of liquid argon. An array of 14 8" cryogenic photomultiplier tubes immersed in liquid argon detects the scintillation light generated by the nuclear recoil, while the ionization charge is detected with a multi stage large electron multiplier (LEM) in the vapor phase. The ionization charge is drifted over a length of more than one meter, extracted at liquid-vapor interface, multiplied by a factor of thousand or more in the LEM and induces a detectable signal on a finely segmented anode, providing millimeter position resolution.

Full 3D imaging capability with high segmentation provides an important handle in dealing with the background, together with self-shielding of the liquid argon, pulse shape discrimination for the scintillation light between nuclear and electron recoils, and charge-to-light ration that again is different for nuclear and electron recoil.

In Spring 2009 the ArDM detector was operated with liquid argon for the first time for about a month, providing an important test of the cryogenics, liquid argon purification and stability of the purity level, and test of a partially completed light readout system, which in turn allowed a first measurement of the light yield.

More tests are foreseen in 2010 to complete the commissioning phase, after which ArDM will be moved underground for the science run.

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