

## Preliminary design of Outer Veto

*Monday 30 October 2023 21:40 (20 minutes)*

This work is devoted to finding the optimal design of an Outer Veto for the DarkSide-20k experiment being built in the Gran Sasso National Laboratory (Italy). The DarkSide-20k experiment seeks to directly detect dark matter in the form of weakly interacting massive particles (WIMPs). The DarkSide-20k detector is a two phase time projection chamber (TPC) filled with 50 tons of underground liquid argon (UAr). The liquid argon (LAr) is used as a scintillator in the experiment. The TPC is located inside a stainless steel vessel. In the space between the membrane cryostat and the stainless steel vessel, it is planned to place the Outer Veto structure. The membrane cryostat is planned to be filled with 650 tons of atmospheric argon (AAr). Thus, AAr will be the scintillator for an Outer Veto. The task of the Outer Veto is to register background events from cosmogenic muons and associated nuclear-active showers that can activate isotopes and can produce high-energy neutrons. The optimal optical model is selected by conducting optical simulations and calculating the light yield. Design parameters are chosen to optimize the light yield. Optical simulations were performed with a Geant4-based framework.

The influence of various design parameters on the light yield of the Outer Veto is presented.

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**Session Classification:** In-person poster session & welcome drinks