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# Ziping Ye (University of Houston): Neutrino Detection in DarkSide-20k

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The core detector of the now planned DarkSide-20K experiment is a two-phase liquid argon time projection chamber (LAr TPC) with 20 tons fiducial mass. It is designed to register possible nuclear recoil events due to rare scattering of dark matter particles and atomic nuclei, and is located deep underground at Gran Sasso National Lab (LNGS) in Italy. DarkSide-20K can achieve background free rare event searches thanks to the following features: a cosmic ray muon veto, a neutron veto, low-radioactivity argon in the TPC, pulse shape discrimination between nuclear recoil and electron recoil, 3D coordinate reconstruction and silicon photomultiplier- based photodetectors. It is thus ideal for weakly interacting massive particle (WIMP) dark matter searches. As a bonus, it is also very promising for studying neutrinos. Neutrino-nucleus coherent scattering would produce nuclear recoils with energies similar to collisions from dark matter particles, however, its relatively large cross section allows a relatively small detector compared to normal neutrino detectors. Our studies show that DarkSide-20K could uniquely contribute to the detection of supernova burst neutrinos, diffuse supernova and stellar neutrinos, solar neutrinos, and other sources of neutrinos. Besides the importance of detecting these various types of neutrinos for study, detecting neutrinos in the DarkSide-20K defines the neutrino floor for WIMP dark matter searches.

**Author:** YE, Ziping

**Presenter:** YE, Ziping

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