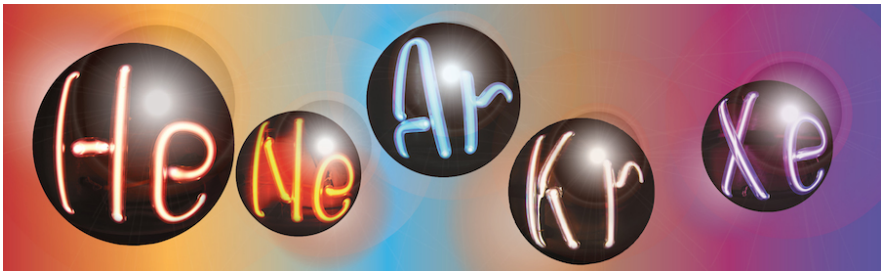

Contribution ID: **14** Type: **Poster**

Neutrino magnetic moment constraint based on DarkSide-50 results

This work investigates the feasibility and sensitivity of constraining the neutrino magnetic moment with liquid-argon detectors using DarkSide-50 data corresponding to an exposure of approximately 12 $\mathrm{ton} \cdot \mathrm{d}$.
To describe solar neutrino scattering in liquid argon, a neutrino–electron elastic scattering model including both weak and electromagnetic interactions is constructed. The analysis is performed using a Profile Likelihood method, with the uncertainties in the solar neutrino flux and background normalizations treated as nuisance parameters. Using the observed DarkSide-50 data, an upper limit on the neutrino magnetic moment of $\mu_\nu < 1.57 \times 10^{-11} \mu_B$ is obtained at 90% C.L.
In addition, Asimov datasets are used to study the impact of exposure and different background components on the projected sensitivity. The results indicate that the ^{39}Ar and PMT backgrounds are the main factors limiting further improvements in sensitivity. For example, at an exposure of 12 $\mathrm{ton} \cdot \mathrm{d}$, assuming effective suppression of the ^{85}Kr background and a 90\% reduction of the ^{39}Ar background, a projected upper limit of $\mu_\nu < 1.05 \times 10^{-11} \mu_B$ can be achieved at 90% C.L.

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