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Leptophilic Dark Matter in Direct Detection Experiments and in the Sun

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Dark matter interacting predominantly with leptons instead of nuclear matter has received a lot of interest recently. In this talk, we investigate the signals expected from such 'leptophilic Dark Matter' in direct detection experiments and in experiments looking for Dark Matter annihilation into neutrinos in the Sun. In a model-independent framework, we calculate the expected interaction rates for different scattering processes, including elastic and inelastic scattering off atomic electron shells, as well as loop-induced scattering off atomic nuclei. In those cases where the last effect dominates, leptophilic Dark Matter cannot be distinguished from conventional WIMPs. On the other hand, if inelastic scattering off the electron shell dominates, the expected event spectrum in direct detection experiments is different and would provide a distinct signal. However, the tension between DAMA and other direct Dark Matter searches cannot be resolved by invoking leptophilic Dark Matter.

Auteur principal: KOPP, Joachim (Fermilab)

Orateur: KOPP, Joachim (Fermilab)

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