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Particle Theory Seminar of LPT Orsay

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LPT, 114
Domaines : hep-ph

Titre : *Extended Dark Matter EFT(s)*

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Résumé : *The search for Dark Matter is one of the main tasks of modern particle physics, which is performed in "mono-X" searches at the LHC, indirect and direct detection experiments. I present a framework in the language of effective field theory (EFT) to describe DM-SM interactions and combine the experimental limits from nuclear energies at Direct Detection experiments to the TeV-scale at the LHC.*

To improve the high energy-validity of conventional DM EFTs a dynamical (pseudo-) scalar is added serving as mediator to the dark sector, represented by a fermion (or scalar), where richer new-physics sectors can be consistently included via higher-dimensional operators. The model is formulated in a gauge-invariant way and allows to confront classical Dark Matter observables with measurements of the Higgs sector. Interestingly the leading effects originate at dimension-five, allowing to capture them with a rather small set of parameters. Constraints on these arising from collider mono-X searches, the relic abundance, indirect and direct detection experiments are presented. The "model-independent" approach allows to apply the results to different UV-complete models such as 2HDM+a, extended fermion sectors and the NMSSM.

In a (shorter) second part I discuss the phenomenology of a specific operator that leads to interesting "mono-di-jet" final states at the LHC or future lepton colliders. The choice of operators is motivated by new flavor symmetries and the effort to explore new final states at collider experiments.