iDMEu breakout session: FIMPs

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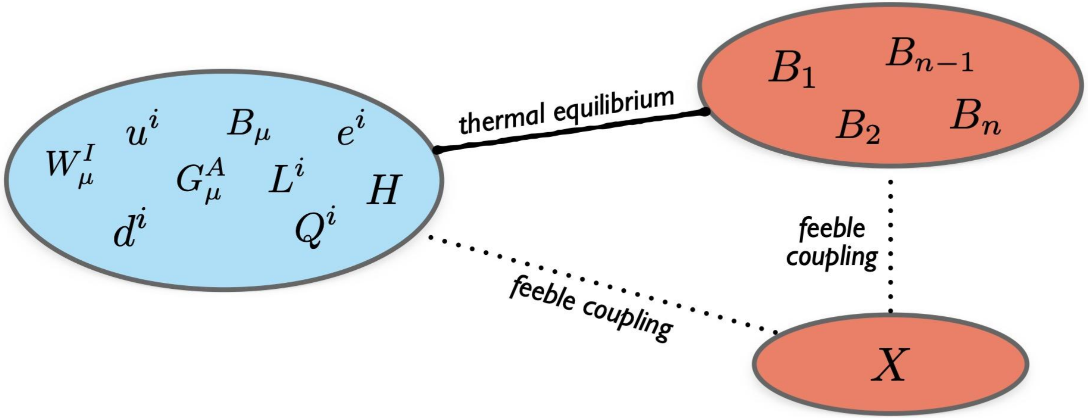

GENERAL FRAMEWORK

Standard model + bath particle B_i and FIMP X

THEORY

Origin of the tiny coupling and its stability under radiative corrections

Higher dimensional operators: interplay with reheating

Mechanism points toward small couplings but not to an overall mass scale (mostly studied for B_i at the weak scale)

PRODUCTION

Decays (IR dominated) and scattering (UV dominated for non-renormalizable interactions) of bath particles

Super-WIMP (B freeze-out and decay)

Non-thermal progenitor (e.g. inflaton)

Inverse semi-annihilation

Modified cosmological histories

SIGNALS FROM FIMPs

ACCELERATORS

Production of B particles and displaced decays to FIMPs

Studies for LHC present, work needed for low-energy accelerators

DIRECT DETECTION

Challenging because of the feeble coulings, within reach for light mediators

COSMOLOGY

Impact on cosmological structures: free-streaming, FIMP self-interactions

INDIRECT DETECTION

FIMP decays to standard model particles if it is not absolutely stable

OUTLOOK

FIMPs are appealing dark matter candidates produced non-thermally

Feeble couplings make it hard to detect them

TOOLS: several ones for WIMPs are useful for FIMPs as well (e.g. B production at colliders) although the production of FIMPs in the early universe may need additional tools

Experimental collaborations: analyses also for FIMPs when applicable (already partially done, e.g. Fermi on decaying dark matter)

Global Analyses needed: different experiments are sensitive to different parameter space of the model (complementarity), the ultimate goal is to reconstruct the dark sector