Outline

- What is Dark Matter
- The Model
- Dark Matter Accumulation
- Up-Scattering in Underground Laboratories
- Conclusions and Outlook
What is Dark Matter

- Dark energy: 68%
- Dark matter: 27%
- Ordinary matter: 5%
Two consequences:

- Not enough energy to give a signal in the detector!
- Can accumulate in the Earth
Two consequences:

▶ Not enough energy to give a signal in the detector!

▶ Can accumulate in the Earth

But we can accelerate it
Use underground nuclear accelerators to *kick* dark matter toward detectors.
Dark Matter Accumulation

Gravity

Evaporation

$N_{\text{events}} \propto N_{\text{DM scattered}} \times \sigma \times n_{\text{nucleons}} \times l_{\text{detector}}$

$N_p \times l_{\text{beam}} \times \sigma \times n_{\text{DM}}$

$\propto \begin{cases} 10^{-7} \text{ events/year} & n_{\text{DM}} = 0.3/\text{cm}^3 \\ 10^{7} \text{ events/year} & n_{\text{DM}} = 10^{14}/\text{cm}^3 \end{cases}$
Conclusions and Outlook

- Strongly interacting dark matter has less energy than the detector threshold
- But it can accumulate!
- Can we do better than current and proposed experiments?

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