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(G*) Using Underground Nuclear Accelerators in the Quest for Dark Matter

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The existence of dark matter is ubiquitous in cosmological data, yet numerous particle detectors have been thoroughly looking for it without any success. For strongly interacting dark matter, the bounds from these experiments are actually irrelevant; as dark matter enters the atmosphere, it scatters and slows down, such that it has a much lower velocity than the detector threshold when it reaches underground laboratories. In this case, however, it would accumulate within the Earth and reach a density much greater than that of the dark matter halo. Here, I will describe a scheme for adapting present-day underground nuclear physics experiments to detect dark matter within this context. In particular, I will show that accumulated dark matter can be up-scattered to resolvable energies using underground nuclear accelerators, such as LUNA in Gran Sasso, and captured in nearby located low-background detectors.

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