March 1997

E-891 (Dixon) **Cryogenic Dark Matter Search (CDMS)**

Fermilab
(and UC/Berkeley, UC/Santa Barbara, Case Western Reserve, San Francisco State, Santa Cruz, Stanford)

Status: *No Data Yet*

The CDMS collaboration is building a detector to search for cold dark matter. There are good reasons to believe that most of the matter in the universe is "seen" only gravitationally, and does not emit or absorb substantial amounts of electromagnetic radiation at any known wavelength. The nature of this "dark matter" is unknown. However, there is some evidence that suggests that the dark matter consists of as yet undiscovered weakly interacting massive particles (WIMPs) that were produced in the early universe. If this is true, then we are immersed in a sea of relic WIMPs which occasionally interact with atomic nuclei as they traverse the Earth. The direct observation of the interaction of WIMPs in a terrestrial detector would solve the "dark matter problem," enable the properties of the dark matter to be measured, and advance our understanding of the physics of elementary particles and the evolution of the early universe.

This experiment will be an upgraded version of the Cryogenic Dark Matter Search experiment (CDMS) currently running at a shallow underground site on the Stanford campus. The CDMS experiment utilizes a new class of elementary particle detectors based on the propagation and detection of phonons in silicon or germanium crystals at temperatures below 0.1 K. CDMS is one of the first experiments capable of searching for WIMPs with properties and fluxes consistent with current expectations from particle physics and cosmology. However, although the CDMS experiment is expected to be a factor of 30 more sensitive than previous searches, this first-generation experiment has only sufficient sensitivity to explore a small region of the interesting parameter space. The second-generation experiment (CDMS II) will be a larger version of CDMS, with a further factor of 30 improved sensitivity. This will enable us to explore for the first time a substantial region of the interesting parameter space. CDMS II will be installed in the low background environment of the Soudan mine in Minnesota. Currently, funding is being sought for CDMS II.

Gift Proposal AAF 1891

#	891
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Spokesperson(s)	Dixon, R.
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