

SCINTILLATORS FOR CRYOGENIC RARE EVENT SEARCHES

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The simultaneous detection of phonon and scintillation signals that result from energy deposition by particles or high-energy quanta is a promising technique. This detection method allows efficient discrimination against electron recoils caused by radioactive background. Phonon-scintillation detectors are well suited for the sensitivity levels required by future experiments searching for rare events, such as interactions of Weakly Interactive Massive Particles (WIMP) and double beta decay. Therefore, identification, characterisation and optimisation of scintillation materials for low-temperature application are important tasks for achieving even better sensitivity of cryogenic searches for such rare events [1].

In this talk we will discuss recent progress accomplished in research and development of scintillation materials for these applications, both in material preparation and in the understanding of scintillation mechanisms, as well as the underlying physics. The results obtained through studying optical properties and scintillation characteristics of the materials selected so far for rare event searches will be presented. Finally, the performance characteristics and the potential of other scintillators will be discussed in view of the requirements imposed on the materials.

References

- [1] V.B.Mikhailik and H.Kraus, J. Phys. D: Appl. Phys., 39 (2006) 1181.