

Intrinsic Background Characterisation of an Ultra-pure NaI Test Crystal for SABRE South

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In this talk, I will present the characterisation results of an ultra-pure NaI(Tl) test crystal for the SABRE South experiment, using background counting and mass spectrometry techniques. I will describe the characterisation methods, including a detailed analysis on ^{238}U and ^{232}Th activities using a likelihood fit to the time distributions of $^{214}\text{Bi} - ^{214}\text{Po}$, and $^{212}\text{Bi} - ^{212}\text{Po}$ coincidences, along with methods for determining the thallium dopant concentration. I will provide results for the light yield, alpha rates, cosmogenic activation, and intrinsic contaminant levels including ^{238}U , ^{232}Th and ^{40}K .

The Sodium Iodide with Active Background Rejection (SABRE) dark matter experiment aims to provide a model independent test of the DAMA/LIBRA annual modulation. SABRE will consist of dual detectors in the Northern and Southern Hemispheres with ultra-pure NaI(Tl) crystals, whose purity is planned to rival that of DAMA/LIBRA. This talk reports on the results for a 3.7 kg crystal made with Merck's AstroGrade quality powder. The crystal, called NaI-035, was produced by RMD, based in Boston, USA. This crystal has low intrinsic background contaminant levels, and demonstrates that viable NaI(Tl) crystals can be grown to meet SABRE requirements.

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