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Dark matter search with the SABRE experiment

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The SABRE (Sodium Iodide with Active Background Rejection) experiment will search for an annually modulating signal from Dark Matter (DM) using an array of ultra-pure NaI(Tl) detectors surrounded by an active scintillator veto to further reduce the intrinsic background. The expected rate of interactions between DM particles and the detector in fact modulates due to Earth's changing velocity relative to the DM halo.

The first phase of the experiment is the SABRE Proof of Principle (PoP), a single 5kg crystal detector operated in a liquid scintillator filled vessel at the Laboratori Nazionali del Gran Sasso (LNGS). The PoP installation is underway with the goal of running in 2017 and performing the first in situ measurement of the crystal background, testing the veto efficiency, and validating the SABRE concept.
As part of this effort, GEANT4-based Monte Carlo simulations have been developed to estimate the background in the PoP based on radio-purity measurements of the detector components. The most recent simulations include detailed versions of the detector part geometries.

The second phase of SABRE will be twin arrays of NaI(Tl) detectors operating at LNGS and at the Stawell Underground Physics Laboratory (SUPL) in Australia. By locating detectors in both hemispheres, SABRE will minimize seasonal systematic effects.

In this talk, the status report of the SABRE PoP activities at LNGS will be presented as well as results from the most recent Monte Carlo simulation.

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