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Search for dark matter with the SABRE experiment

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The Sodium-iodide with Active Background REjection (SABRE) experiment is designed to search for the annual modulation of dark matter interaction rate with NaI(Tl) crystals. The experiment will also be able to perform a conclusive model-independent test of the notorious DAMA/LIBRA annual modulation signal. This signal is compatible with the WIMP-nucleon scattering hypothesis, but it is in contrast with observations from different-target dark matter experiments. SABRE will perform a high sensitivity search using NaI(Tl) crystals with unprecedented radio-purity operated inside a liquid scintillator veto for active background rejection. The project comprises twin detectors located in the northern and southern hemispheres to identify any possible contribution to the modulation from seasonal or site-related effects.
In the first phase of the experiment, the SABRE Proof-of-Principle (PoP), a single 5 kg crystal detector is hosted in a liquid scintillator filled vessel at the Laboratori Nazionali del Gran Sasso. This phase is underway with the aim to measure the crystal background, to test the active background rejection system, and to validate the SABRE concept.
This talk will illustrate the concept of the SABRE experiment and will present the latest estimate of the background for the SABRE Proof-of-Principle. Assuming such background model, the sensitivities of the experiment to spin-independent WIMP-nucleon scattering and to the DAMA/LIBRA modulation are assessed.

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