

SABRE: WIMP Modulation Detection in the Northern and Southern Hemisphere

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SABRE (Sodium-iodide with Active Background REjection) is a NaI(Tl) experiment designed to search for Dark Matter through the annual modulation signature. A DM signal on an Earth-based detector is expected to modulate yearly due to the change of the Earth's speed relative to the galactic halo reference frame. The long standing result from the DAMA/LIBRA experiment at the Gran Sasso National Laboratory (LNGS) is consistent with this scenario, while a confirmation of this result by an independent experiment is still missing. SABRE consists of highly pure NaI(Tl) crystals operated in an active liquid scintillator veto. The scintillator provides a veto against external backgrounds and allows to tag the background arising from detector components. The SABRE experiment follows a two-phase approach. In the first phase, high-purity NaI(Tl) crystals will be operated at LNGS in an active liquid scintillator veto with the goal of lowering the background in the region of interest for Dark Matter detection at a level that is significantly below the one observed by DAMA/LIBRA. An unprecedented radio-purity for both the NaI powder and the crystal growth is needed to achieve this goal. The second phase will consist of two NaI(Tl) detector arrays located at LNGS and in the Stawell Gold Mine in Australia. The operation of twin full-scale experiments in both the northern and the southern hemisphere will strengthen the reliability of the result against possible seasonal systematic effects.

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