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Trigger and data acquisition systems for SABRE South

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The SABRE (Sodium-iodide with Active Background REjection) South experiment, located at the Stawell Underground Physics Laboratory (SUPL) in Australia, aims to measure an annual modulation in dark-matter interactions using ultra-high-purity NaI(Tl) crystals. In partnership with the SABRE North effort at the Gran Sasso National Laboratory (LNGS), SABRE South is designed to disentangle any seasonal or site-related effects from the dark matter-like modulated signal observed by DAMA/LIBRA in the Northern Hemisphere.

SABRE South is instrumented with 7 ultra-high-purity NaI(Tl) crystals surrounded by a liquid scintillator veto, and covered by 8 plastic scintillator muon detectors. Each NaI(Tl) crystal and muon detector is coupled to 2 photomultiplier tubes (PMTs) and a further 18 PMTs are used to detect interactions in the liquid scintillator giving a combined total of 48 channels. The data acquisition system for SABRE South utilises a number of CAEN digitisers to acquire waveform data for each of these PMTs. The trigger system is built upon a CAEN logic unit using custom FPGA logic which is extensively simulated and also tested in hardware to ensure long term reliability.

In this poster, the design and status of the SABRE South trigger and data acquisition systems will be shown.

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