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Measurements of Cosmic Ray Correlated Events at the Soudan Underground Laboratory

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Soudan Underground Laboratory houses a large muon veto shield lining the Soudan-II proton decay experimental cavern. Since the Soudan-II detector has been removed the shield has undergone a refurbishment which allows detection and tracking of through-going muons in the 30x17x12 m cavern. Further, this veto shield can be used in conjunction with other experiments housed within its walls. Particularly interesting is the possible measurement of cavern muons coincident with high-energy energy neutron detections in the Neutron Multiplicity Meter (NMM), a 4-ton gadolinium-loaded water-Cherenkov detector situated atop a 20-kiloton lead target. Here we cover the ability of the shield and encapsulated detectors to achieve coincident timing resolutions of about 1 microsecond via GPS-synchronized absolute time electronics. In addition, the usage of such technology for constraining muon-neutron correlations underground is discussed.

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