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# Simulations of the South Pole Neutron Monitors

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Cosmic rays are high energy particles traveling nearly the speed of light through space. When cosmic rays enter the earth's atmosphere, they interact with nucleons and start a chain reactions that produce showers of secondary particles, including neutrons, that can reach the surface These neutrons are detected by neutron monitors placed around the globe. The number of neutrons recorded by a neutron monitor depends on the state of the earth's magnetosphere, which can be modulated by solar activity. In this sense neutron monitors observe space weather. UW-River Falls maintains neutron monitors at the South Pole, McMurdo Station, and on campus. To better understand the data from neutron monitors, Monte Carlo simulations are done. A response function, which characterizes the rates of particles detected, can be used to compare different configurations of neutron monitors. Simulations of different types of neutron monitors with the same incident flux of cosmic rays and same atmospheric conditions are used to investigate the response functions. We determined the response function of five different types of neutron monitors without simulating the buildings housing them. We then extended the simulations to explore the effects the physical environment has on the count rates of twelve neutron monitors tubes at the Amundsen-Scott Station at the South Pole. Results of the simulated response functions of five types of neutron monitors tubes along with the preliminary results of environmental effects on twelve neutron monitors at the South Pole will be presented.

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