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Acoustic transient event reconstruction and sensitivity studies with the South Pole Acoustic Test Setup

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The South Pole Acoustic Test Setup (SPATS) consists of four strings, which are deployed in the upper 500 m of IceCube holes. Each string is instrumented with seven acoustic sensors and transmitters to study attenuation length, noise level, sound speed and transient acoustic events in the ice within the 10 to 100 kHz frequency range. Data taking and investigation of transient events started end of August 2008 and continues until now.

Applying an algorithm based on the solution of a GPS like equation system on the data, allows to reconstruct the source of acoustic signals in the antarctic ice with high precision. Thus, acoustic signals from re-freezing IceCube holes during the IceCube construction phases 11/08-02/09 and 11/09-02/10 are identified. These data allow us to verify functionality and sensitivity of the acoustic test detector and to investigate the background of possible high energetic neutrino signals in the ice.

Until now all detected acoustic events are associated with sources, where a clear connection to human activities at the South Pole is given. The investigation of the transient noise is used in simulation studies in the SPATS sensitive area outside IceCube. An effective volume is calculated from which a neutrino flux limit in reach for the SPATS is derived.

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