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RASTA - a 'Radio Air-Shower Transients Array' for IceCube

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We explore the possibility to complement the cosmic ray physics program of the IceCube observatory with an extended surface array of radio antennas.

The combination of air-shower sampling on the surface and muon calorimetry underground offers significant scientific potential: the neutrino sensitivity above the horizon can be enhanced by vetoing air-showers on the ground, photon-induced air-showers can be identified by their small muon component and the coincident measurement of the particle density on the surface and the muon component gives useful information on the composition of the primary flux.

All of these analyses are pursued with the existing IceTop array. However, the IceTop footprint is small compared to the acceptance of the InIce sensor array, which severely limits the solid angle for coincident measurements, calling for an extended surface air-shower detector. As demonstrated by the LOPES experiment, measuring air-showers through their geosynchrotron emission has become a viable and cost-efficient method. The science case for the RASTA project - a dedicated radio array seeking to exploit this method at the South Pole - will be presented.

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