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A Surface Array to Study Astrophysical Neutrinos with IceCube-Gen2

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Motivated by the discovery of high-energy astrophysical neutrinos with IceCube, we study the prospects for improved measurements of neutrinos of astrophysical origin with a surface detector array combined with IceCube or a next generation neutrino detector at the South Pole. The background in astrophysical neutrino searches is reduced by tagging muons and neutrinos of atmospheric origin through the detection of the accompanying air shower. We discuss the ways in which a surface array can help study the features of the astrophysical neutrino flux and consider a few physics cases that motivate such an array. We will present the various approaches used to understand the capabilities of surface arrays. The prospects of a surface array for studying the cosmic ray flux will be briefly discussed.

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