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Searching for high-energy neutrinos from the most luminous supernovae with the IceCube Neutrino Observatory

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The sources of the astrophysical neutrino flux discovered by IceCube remain for the most part unresolved. Extragalactic core-collapse supernovae (CCSNe) have been suggested as potentially able to produce high-energy neutrinos. In recent years, the Zwicky Transient Facility has discovered a population of exceptionally luminous supernovae, whose powering mechanisms have not yet been fully established. A fraction of these objects falls in the broader category of type IIn CCSNe, showing signs of interaction with a dense circumstellar medium. Theoretical models connect the supernova photometric properties to the dynamics of a shock-powered emission, predicting particle acceleration. In this contribution, we outline the plan for a search of high-energy neutrinos targeting the population of superluminous and Type IIn supernovae with the IceCube Neutrino Observatory.

Summary

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