Contribution ID: **97** Type: **not specified**

Neutrinos from core-collapse supernovae at KM3NeT

Wednesday, 7 September 2022 15:40 (20 minutes)

On behalf of the KM3NeT Collaboration

The SN1987A core-collapse supernova was the first extragalactic transient source observed through neutrinos. The detection of the 25 associated neutrinos by the Super-Kamiokande, IMB and Baksan experiments marked the beginning of neutrino astronomy. Since then, neutrino telescopes have not been able to make another observation due to the remoteness of the sources. It is therefore essential to optimize the detection channel of sensitive detectors in case of an upcoming galactic core-collapse supernova. Neutrino observations would, in particular, provide first-hand information about the core-collapse mechanism as well as the behavior of particles in dense environments. In this contribution, we discuss how the unique structure of the optical modules of the KM3NeT neutrino experiment would allow to observe supernova neutrinos. We present KM3NeT's sensitivity to galactic supernovae and describe its associated online alert system for multi-messenger studies. Finally, we discuss KM3NeT's ability to infer the supernova evolution from the time profile of the associated neutrino emission.

Summary

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Session Classification: Multimessengers