Contribution ID: **704** Type: **Talk in the parallel session**

Joint Analysis Method on Gravitational Waves and Low-Energy Neutrinos to Detect Core-Collapse Supernovae

Tuesday, 6 July 2021 08:00 (20 minutes)

Core-collapse supernovae are fascinating astrophysical objects for multimessenger studies. Gravitational waves (GWs) are expected to play a role in the supernova explosion mechanism, but their modelling is also challenging due to the stochastic nature of the dynamics and the vast possible progenitors, and moreover, the GW detection from these objects is still elusive with the already advanced detectors. Low-energy neutrinos will be emitted enormously during the core-collapse explosion and can help for the gravitational wave counterpart search. In this work we develop a multi-messengers strategy to search for such astrophysical objects by exploiting a global network of both low-energy neutrino and gravitational wave detectors. First, we discuss how to improve the detection potential of the neutrino sub-network by exploiting the temporal behaviour of a neutrino burst from a core-collapse supernova. Then, we combine the information provided by GW and neutrino in a multi-messenger strategy. Our method can better disentangle from noise the low statistical signals coming from weak (or far) supernovae giving us about 10^3 lower \textit{false-alarm-probability} for recovered signal injections.
Keywords: multimessenger supernova core-collapse low-energy neutrino gravitational wave.

Primary authors: Dr HALIM, Odysse (Istituto Nazionale di Fisica Nucleare (INFN) sez. di Trieste, Italy,); Dr CASENTINI, Claudio (Istituto Nazionale di Astrofisica - Istituto di Astrofisica e Planetologia Spaziali (INAF - IAPS), Rome, Italy,); Dr DRAGO, Marco (Universita‘ di Roma La Sapienza, I-00185 Roma, Italy and INFN, Sezione di Roma, I-00185 Roma, Italy); Prof. FAFONE, Viviana (University of Rome Tor Vergata, Rome, Italy, and Istituto Nazionale di Fisica Nucleare (INFN) sez. di Roma Tor Vergata, Rome, Italy.); Dr VIGORITO, Carlo (University of Turin, Italy, and Istituto Nazionale di Fisica Nucleare (INFN) sez. di Torino, Italy,); Dr PAGLIAROLI, Giulia (Gran Sasso Science Institute (GSSI), L’Aquila, Italy, and Istituto Nazionale di Fisica Nucleare (INFN) sez. di LNGS, Assergi, Italy,)

Presenter: Dr HALIM, Odysse (Istituto Nazionale di Fisica Nucleare (INFN) sez. di Trieste, Italy,)

Session Classification: Sources of Gravitational Waves

Track Classification: Gravitational Waves: Sources of Gravitational Waves