Space Science Seminar
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A Dual Population of Short Gamma-Ray Burst Observations and the Coincident Detection with aLIGO

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As with the first direct observations of the gravitational waves GW150914, GW151226, and the candidate LVT151210 emitted by the coalescence of two black holes, LIGO has opened the new area of Gravitational-Wave astrophysics. The neutron-star mergers (either double neutron star systems or neutron star - black hole) are the next candidates for the detection of these Gravitational Waves. They are thought to be also the progenitor of an electromagnetic emission called short Gamma-Ray Bursts (sGRBs). The next discovery could lead to the detection in coincidence of both the gravitational wave and the electromagnetic emission that will open a new window in astrophysics: the multi-messenger area.

In order to prepare for this detection, we have derived an estimate of the detection rate for such a coincident event, seen both by a FERMI-like satellite and the different GWs detector that will be used in the next couple of years such as Advanced LIGO (aLIGO) and Advanced VIRGO (AdV). This rate has been derived from realistic Monte-Carlo simulations accounting for both GW and GRB selection effects and actual observational data. The sample of sGRBs has been selected in order to obtain the largest validated sample to date with known redshift.

We show that a second population of nearby low-luminosity sources is needed to match the simultaneous results as well as realistic SFRs and merger delays. We discuss the properties of this new population and its potential progenitor: the merger of a neutron star with a black hole in a globular cluster and its implication for the detection in coincidence with aLIGO/AdV.

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