Searches for high-energy neutrinos in coincidence with gravitational waves with the ANTARES and VIRGO/LIGO detectors

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\textbf{Abstract}: Cataclysmic cosmic events can be plausible sources of both gravitational waves (GW) and high-energy neutrinos (HEN). Both GW and HEN are alternative cosmic messengers that may traverse very dense media and travel unaffected over cosmological distances, carrying information from the innermost regions of the astrophysical engines. Such messengers could also reveal new, hidden sources that were not observed by conventional photon astronomy.

A neutrino telescope such as ANTARES can determine accurately the time and direction of high energy neutrino events, and a network of gravitational wave detectors such as LIGO and VIRGO can also provide timing/directional information for gravitational wave bursts. Combining these informations obtained from totally independent detectors can provide original ways of constraining the processes at play in the sources, and also help confirming the astrophysical origin of a HEN/GW signal in case of concomitant observation.

This contribution describes the first GW+HEN joint search conducted with the ANTARES and LIGO/VIRGO detectors using concomitant data taken in 2007 during the VIRGO VSR1 and LIGO L5 science runs, while ANTARES was operating in a 5-line configuration. The specific strategies developed in ANTARES for the selection of HEN candidates used in the joint search will be discussed, together with the possible methods for the combination of HEN and GW data currently under investigation. Perspectives will also be given for the analysis of the data taken during the 2009 VIRGO/LIGO science run conducted with upgraded detectors (VIRGO+, eLIGO and ANTARES 12-lines) providing enhanced sensitivity both to HENs and GWs.

\textbf{Keywords}: neutrino astronomy; gravitational waves

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