Contribution ID: **4** Type: **not specified**

GW optical counterpart search in the Multi-Messenger Astronomy Era

Thursday, 1 March 2018 18:10 (20 minutes)

The discovery of the GW170817's optical counterpart has shown the wealth of information and science that can be gathered from such findings.
As foreseen from theories and verified with the last GW event on the O2 run, the merging of two binary neutron stars produce a bright optical counterpart. The same is expected in the BH-NS coalescence while more controversial is the case of merging of two Black Holes. In spite of the substantial reduction of the sky error box, thanks to the detectors triangulation envolving Virgo, still the search of optical counterpart is challenging in particular if coming from GW sources far away that implies faint optical transients.
We describe the effort and the technics used for the optical surveys used for such searches considering in particular the case of the program based on the VLT Survey Telescope facility at ESO Cerro Paranal.

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Session Classification: Impact of Gravitational-Wave Surveys and Multi-messenger Observations on Astrophysics, Cosmology and Other Branches of Fundamental Physics