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Prospect for spectroscopic observations of Rubin detected counterparts of gravitational wave events from next generation interferometers

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Gravitational wave (GW) multi-messenger (MM) observations of binary neutron star systems mergers (BNSs) are extremely challenging. With current GW interferometers, BNS detection rates are low. This will significantly improve with next generation gravitational wave interferometers, such as the Einstein Telescope (ET). These latter will detect thousands of BNS beyond the Local Universe, revolutionizing MM astrophysics.
Electromagnetic (EM) counterparts of ET BNS detections will likely be faint and to be found within large error regions among a huge number of contaminants. Photometric observations with Rubin will be fundamental to detect counterpart candidates. To exploit such observations at best, it is necessary to identify and characterize the EM counterparts. To this purpose spectroscopic observations are mandatory in most cases, and currently they are the bottleneck of GW-MM science.
In this context, I am exploring the possibility of using the next generation Integral Field Spectroscopy (IFS) and Multi-Object Spectroscopy (MOS) to this aim, considering the synergy with Rubin photometric observations. I will present the results of the work I am carrying out within the Wide-field Spectroscopic Telescope (WST) science team and the MM division of the ET Observing Science Board to prepare WST observations to identify the EM counterparts of ET BNS detections.

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