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The H.E.S.S. Gravitational Wave Rapid Follow-up Program during O2 and O3

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Since 2015, the direct detection of Gravitational Waves (GW) became possible with groundbased interferometers like LIGO and Virgo. GWs became the center of attention of the astronomical community and electromagnetic observatories took a particular interest in follow-up observations of such events. The main setback of these observations is the poor localization of GW events. In fact, GW localization uncertainties can span 10s to 100s of deg^2 in the sky even with the advanced configurations of current GW interferometers. In this contribution, we present five follow-up algorithms developed for the High Energy Stereoscopic System (H.E.S.S.) and assess their performances. We show how a 2D and 3D galaxy targeted search approach exploiting the integral probability inside the instruments field of view are best suited for medium field of view instruments like H.E.S.S. We also develop an automatic response scheme within the H.E.S.S. Transient Follow-up system that is optimized for fast response and is capable of responding promptly to all kind of GW alerts. GW events are filtered by the developed scheme and prompt and afterglow observations are automatically scheduled. The H.E.S.S. response latency to prompt alerts is measured to be less than 1 minute. With this continually optimized GW response scheme, H.E.S.S. scheduled several GW follow-up observations during the second and third LIGO/Virgo observation runs.

Keywords

Gravitational Waves, Follow-up algorithm, H.E.S.S.

Collaboration

other Collaboration

Subcategory

Experimental Methods & Instrumentation

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