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The H.E.S.S. Gravitational Wave and Gamma-Ray Burst Follow-Up Programs

Multi-wavelength and multi-messenger astrophysics have experienced rapid growth over the past decade, seeking a complete picture of different cosmic phenomena. Transient sources, in particular, benefit from the input of multi-messenger observations, offering complementary perspectives on the same event while maximizing the detection probability of a rapidly fading signal.
In this context, gravitational wave (GW) detections serve as perfect triggers for potential counterpart detections. Notably, a GW alert could be associated with a Gamma-Ray Burst (GRB), jetted cataclysmic events produced either by the collision of a binary neutron star system or a core-collapse supernova. These sources also radiate across the electromagnetic spectrum, allowing detection by X- and gamma-ray instruments aboard various satellites and thus enabling multi-wavelength triggering opportunities. The strong interest in minimizing reaction time to capture the full-time evolution of the emission, together with the often challenging localization regions of the alerts, underscores the need for rapid and well-coordinated follow-up programs such as the one developed by the H.E.S.S. Collaboration.

This contribution will give an overview of the transient follow-up strategy carried out by the H.E.S.S. collaboration, from the external alert trigger and the automatic reaction of the observatory to the various analysis steps of the obtained observations. To illustrate this comprehensive strategy, we will present several examples of follow-up observations of both GRBs and GWs, highlighting key results and challenges in the search for associated high-energy gamma-ray emission.

Collaboration(s)

High Energy Stereoscopic System (H.E.S.S.)

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