

The MAGIC multi-messenger transient VHE searches

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Very high energy astrophysical sources show flaring and transient behaviour on different timescales, from fraction of seconds to years. These transient sources are usually observed and monitored over the whole electromagnetic spectrum. This contribution will outline the very high energy (VHE, $E > 100$ GeV) transient search program operated by the MAGIC telescopes. In this context, Imaging Atmospheric Cherenkov telescopes like MAGIC face many challenges in the observation of transient sources at VHE, due to their intrinsic low duty cycle and their limited field of view. Nonetheless, the planning of targeted follow-up strategies proved to be successful in the observation of transients.

Transient sources are associated with the most powerful progenitor systems comprising compact objects like black holes and neutron stars. The newly born multi-messenger astrophysics connects the information obtained by electromagnetic observations with those obtained by gravitational wave and neutrino experiments. The extreme environments at play in VHE transient phenomena are exquisite multi-messenger sources.

In this contribution, a particular highlight will be given to the rapid follow up operated by MAGIC responding to alerts provided by EM and multi-messenger facilities like Gamma-ray burst (GRB) detectors, the LIGO/Virgo and IceCube experiments. Such synergies were the key to many outstanding results, as demonstrated by the detection of the flaring blazar TXS-0506+06 in coincidence with a high energy neutrino and the first time detection of a GRB at VHE by MAGIC, GRB-190114C.

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