Prospects for Galactic transient sources detection with the Cherenkov Telescope Array

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In this contribution, we will show some of the results of exploring the capabilities of Cherenkov Telescope Array (CTA) to detect and observe Galactic transient sources, assuming different array configurations and observing strategies.

Several types of Galactic sources, like magnetars, microquasars, novae or pulsar wind nebulae flares, display transient emission in the X-ray band. Some of these sources have also shown emission at MeV–GeV energies. However, none of these Galactic transients have ever been detected in the very-high-energy (VHE; E>100 GeV) regime by any Imaging Air Cherenkov Telescope (IACT). CTA will perform real-time TeV studies of the variable Galactic sky. Its unique sensitivity to short-timescale events and its low energy threshold make this observatory a powerful and efficient instrument to detect and discover new transient sources.

We have tested the capabilities of CTA to detect transient VHE emission for different kinds of Galactic sources. We have assumed different array configurations, namely the full CTA Northern (CTA-N), and CTA Southern (CTA-S) arrays, as well as different sub-arrays of CTA telescopes and observing strategies. We have tested how CTA will be able to detect three source examples such as microquasars, flaring pulsar wind nebulae and transitional millisecond pulsars, which are sources that are known to show MeV emission.

We show that CTA will be able to detect, for the first time, many Galactic transients never detected in the VHE regime. CTA will be able to detect microquasars such as Cyg X-1, Cyg X-3 and SS433 in the GeV-TeV domain for the first time. It will also be able to probe the flaring episodes of PWNe (namely the Crab Nebula) at VHE. CTA will detect for the first time the VHE component of tMSPs, by performing dedicated long-time observations (>50h) during the accretion state.