Particle acceleration at Ultra Fast Outflows

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Ultra Fast Outflows (UFOs) are sub-relativistic dense winds launched from Active Galactic Nuclei with wide aperture angle„ at which strong shocks are expected to form, typically with Mach number such that $\mathcal{M} \gg 1$.

At these shocks, particle energisation through diffusive shock acceleration (DSA) should lead to the copious production of gamma rays and neutrinos through the interaction of accelerated charged particles and the surrounding circumnuclear medium.

We model this particle acceleration through DSA at UFO shocks and estimate the associated high-energy gamma-ray and neutrino fluxes, and investigate the prospects for detection with current and next generation gamma-ray and neutrino observatories.

For a selected list of nearby UFOs, we identified the best candidates for detection with next generation gamma-ray observatories such as CTAO, and discuss the potential for detection with neutrino observatories such as KM3NeT.