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High-energy and very high-energy gamma-ray emission from the magnetar SGR 1900+14 neighbourhood

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Magnetar wind nebulae (MWNe), created by new-born millisecond magnetars, and magnetar giant flares are PeVatron candidates and even potential sources of ultra high energy (E>1018 eV) cosmic rays (UHECRs). Non-thermal high-energy (HE, E>100 MeV) and very high-energy (VHE, E>100 GeV) γ-ray emission from magnetars neighbourhoods should be a promising signature of acceleration processes. We investigate a possibility of explaining HE and VHE γ-ray emission from the vicinity of the magnetar SGR 1900+14 by cosmic rays accelerated in a Supernova remnant of a magnetar-related Supernova and/or in a MWN. Simulation of the observed HE (the extended Fermi-LAT source 4FGL J1908.6+0915e) and VHE (the extended H.E.S.S. source candidate HOTS J1907+091 and the point-like HAWC TeV source 3HWC J1907+085) γ-ray emission, spatially coincident with the magnetar SGR 1900+14, was carried out in the framework of hadronic (pp collisions with a subsequent pion decay) and leptonic (inverse Compton scattering of low energy background photons by ultrarelativistic electrons) models. We show that under reasonable assumptions about parameters of the circumstellar medium the observed γ-ray emission of Fermi-LAT 4FGL J1908.6+0915e, H.E.S.S. HOTSJ1907+091 and 3HWC J1907+085 sources may be explained or at least considerably contributed by a (still undetected) magnetar-connected Hypernova remnant and/or a MWN created by new-born millisecond magnetar with a large reserve of rotational energy Erot~1052 erg.

Primary authors: Dr GNATYK, Roman (Astronomical Observatory of Taras Shevchenko National University of Kyiv); Mr VOITSEKHOVSKYI, Vadym (Astronomical Observatory of Taras Shevchenko National University of Kyiv)

Presenter: Mr VOITSEKHOVSKYI, Vadym (Astronomical Observatory of Taras Shevchenko National University of Kyiv)

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