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Do we really need AGN components to describe the low energy part of the IceCube astrophysical flux?

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The diffuse astrophysical neutrino flux measured in the very high energy range introduced unresolved issues about the origin of these events and underlined as a viable solution the multi-component scenario. Recent studies show that galaxies with high star formation rate (above teens Mo/year) can be responsible of a seizable fraction of the observed astrophysical flux.
Despite their low luminosity, they can be considered as guaranteed "factories"of high energy neutrinos, being "reservoirs"of accelerated cosmic rays and hosting a high density target gas in the central region. On the other hand, in the same range of energies, recent measurements of IceCube and Antares telescopes set the contribution correlated with the diffuse Galactic emission. The Milky Way is a prominent astrophysical lab to correlate the high-energy diffuse emission with the physics of cosmic-ray injection and propagation as well as with the measured molecular gas distribution.
In this contribution we describe in details these two diffuse astrophysical components, presenting recent phenomenological studies and reviewing current observations made by high-energy neutrino telescopes

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