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Gamma-ray and neutrino emissions from star-forming and starburst galaxies

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Experimental observations have demonstrated a strong correlation between star-forming processes and gamma-ray luminosities. However, the very nature of these emissions is still under debate. Certainly, star-forming and starfurst galaxies (SFGs and SBGs) are well-motivated astrophysical emitters of gamma-rays and neutrinos through hadronic collisions. In this talk, I will present several updates on their non-thermal radiations, revisiting both their point-like and cumulative (diffuse) emission properties. From the point-like side, I will discuss the potentialities of future gamma-ray (CTA, SWGO) and neutrino (KM3NeT/ARCA, IceCube-gen2) telescopes to quantitively scrutinize their gamma-ray and neutrino expectations from different cosmic-ray transport models. From the diffuse perspective, I will investigate a model based on a data-driven blending of spectral indexes, thereby capturing the observed changes in the properties of individual emitters. Strikingly, SFGs and SBGs can explain up to 40% of the diffuse HESE data, while remaining consistent with gamma-ray limits on non-blazar sources.

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