Contribution ID: **329** Type: **oral**

Particle acceleration and gamma-ray emission from starburst galaxies

Thursday, 26 September 2024 14:51 (17 minutes)

The intense star-forming activity typical of starburst galaxies results in unique conditions for high-energy particles. The enhanced supernova rate associated with such star formation can in fact transfer a large amount of power to non-thermal particles which, in turn, can lose most of their energy in the dense and perturbed starburst environment before being able to escape it. I will discuss the transport conditions in starburst galaxies and their multimessenger implications in terms of gamma rays and high-energy neutrinos. The starburst activity can also launch and sustain powerful galactic wind bubbles extending for several kiloparsecs. I will illustrate how particles can be accelerated up to hundreds of PeV at shocks produced in such winds and I will highlight the associated high-energy radiation. Finally, by taking into account the star formation history of the Universe, I will assess the potential contribution of starburst galaxies to the observed diffuse flux of gamma rays, high-energy neutrinos and cosmic rays at energies beyond the Knee.

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Session Classification: Searches for Extragalactic astrophysical sources 2