



Contribution ID: 1334

Type: **Poster contribution**

Gamma-Ray and Cosmic Ray Escape in Intensely Star-Forming Systems

Thursday, 30 July 2015 15:30 (1 hour)

Regions of intense star-formation naturally generate high number densities of cosmic rays and as such, they are of particular interest as potential contributors to the extragalactic gamma-ray background (EGRB) and as potential sources of very high-energy cosmic rays (VHECRs). While models of the starburst contribution to the EGRB often assume cosmic rays are confined in starbursts, cosmic rays must escape from these galaxies if they contribute to the spectrum of VHECRs as observed at Earth. The conditions in star-forming galaxies which are responsible for such high cosmic-ray injection rates also lead to large gamma-ray fluxes, except in the case of Compton thick systems where the highest energy photons are prevented from escaping. To address these contrasting ideas, we model the gamma-ray fluxes from galaxies where cosmic rays are confined and from galaxies with strong galactic winds and explore the relationship between cosmic-ray confinement and gamma-ray absorption. We present results for the nearby starburst galaxy M82 and the ultraluminous infrared galaxy Arp 220 as examples.

Collaboration

– not specified –

Registration number following "ICRC2015-I"

995

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