Modeling the diffuse signatures of cosmic ray microphysics in and around galaxies

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Purpose Estimate the contribution to the extragalactic gamma-ray background from star-forming galaxies

Outline This work established the importance of star-forming galaxies in the gamma-ray background, and investigated the nature of the galaxies that dominate the background emission

Result Star-forming galaxies can contribute a few 10s of percent of the gamma-ray background flux (see figure). Their contribution is dominated by highly star-bursting galaxies, with the emission originating just prior to the peak of star-formation in the Universe, around 11 billion years ago. Most of these galaxies are relatively low mass.

Computing system: OCTOPUS General Purpose
CPU nodes
- node-hour 12,600 node-hour
- memory used 12 GB
- parallelize 4 nodes

Software: FLASH4 and novel MPI simulation codes