

## Inelastic interactions of cosmic rays with the interstellar medium in the Milky Way

**Context:** Astrophysical plasmas; Numerical Simulations; Instabilities

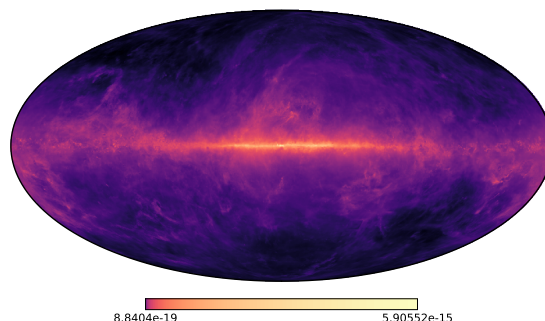
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### Abstract

If humans would have eyes sensitive to gamma rays, a bright band would be “visible” in the southern night sky. These gamma rays are partly produced in inelastic interactions of cosmic rays (i.e., mostly charged particles reaching relativistic velocities) with matter distributed mainly in the disk of our Galaxy. Recent data imply that the fraction of heavy cosmic ray nuclei changes with energy. Hence, a good understanding of inelastic nuclear interactions, typically implemented in simulation tools such as the PICARD code, is needed to understand the observed gamma-ray spectrum. The bachelor project consists of understanding inelastic nuclear interactions of Galactic cosmic rays with matter in general, and applied to the Milky Way. In particular, the goodness of the approximations for this process as implemented in the PICARD code shall be evaluated by comparing with the results of corresponding Monte-Carlo simulations using public event generators.

### Helpful Skills

- Interest in nuclear physics reactions
- Interest in numerical modelling



Numerical model of Galactic diffuse gamma-ray emission