

Contribution ID: 1067

Type: Talk

Cosmic-ray induced ionisation and spatio-temporal correlations between supernova remnants and molecular clouds

Thursday 17 July 2025 13:20 (15 minutes)

MeV cosmic rays can penetrate dense molecular clouds and oftentimes dominate the ionisation, thus contributing to the physical and chemical dynamics of star forming regions. The effect of cosmic rays can be quantified by their ionisation rate. Interestingly, the ionisation rate predicted from the locally measured cosmic-ray fluxes is one to two orders of magnitude lower than the observed ionisation rates. This disagreement is known as the ionisation puzzle. Previously, it was shown that the point-like nature of cosmic-ray sources implies a stochastic scatter in the stochastic ionisation rates. Drawing distances between clouds and supernova remnants randomly, the discrepany between model and observations could be reduced. Here, we extend this model by considering spatial and temporal correlation between source and cloud positions. These are to be expected to a certain degree as supernova remnants are likely formed in the same cloud complexes. We will present the predictions for different assumptions on the correlations and compare to ionisation data.

Collaboration(s)

Authors: JACOBS, Hanno (TTK, RWTH Aachen University); BERKNER, Mareike (TTK, RWTH Aachen University); MERTSCH, Philipp (RWTH Aachen University); PHAN, Vo Hong Minh (LUX, Sorbonne University)

Presenter: MERTSCH, Philipp (RWTH Aachen University)

Session Classification: CRD

Track Classification: Cosmic-Ray Direct & Acceleration