Contribution ID: **949** Type: **Talk**

Estimating cosmic-ray induced ionization rates in molecular clumps close stellar clusters

Thursday 17 July 2025 13:50 (15 minutes)

Low-energy cosmic rays (LECRs) are a vital ingredient of the interstellar medium (ISM). Unlike ionizing radiation, they can penetrate deeply in dense environments and are considered as the main ionizing agent for the core of molecular clumps, ultimately determining their stability against gravitational collapse. Young massive star clusters are known to shape the surrounding ISM, excavating large cavities inflated by the powerful winds blown by the OB stars hosted in their core. The presence of these wind-blown bubbles can affect the propagation of LECRs, preventing their penetration into these cavities. Because of this, molecular clumps embedded in wind-blown bubbles are not reached by sub-GeV particles. The lack of LECRs can favor the gravitational collapse of such clumps, effectively representing a positive (never explored) feedback channel for star formation. In this work, we present an estimate of the LECR-induced ionization rate for molecular clumps embedded in wind-blown bubbles. We also account for the presence of cosmic rays produced by the star cluster, and we discuss how their inclusion can increase the ionization rate, leading to a possible negative feedback for star formation.

Collaboration(s)

Author: MENCHIARI, STEFANO (IAA-CSIC)

Co-authors: AMATO, Elena; MORLINO, Giovanni (INAF)

Presenter: MENCHIARI, STEFANO (IAA-CSIC)

Session Classification: CRD

Track Classification: Cosmic-Ray Direct & Acceleration