ID de Contribution: **34** Type: **Non spécifié**

The Musca molecular cloud: An interstellar symphony

mercredi 23 mai 2018 11:45 (20 minutes)

Molecular clouds are the birthplaces of stars. Their structure and evolution hold the key to understanding the initial conditions of star and planet formation, and the physics that sets the distribution of masses and multiplicities of newborn stars. However, their complexity, their typically turbulent, filamentary, disordered appearance, and ubiquitous projection effects hinder all efforts to model them in detail. An exception to this messy picture is found in a recently discovered class of structures, molecular cloud striations: ordered, low-column-density, quasi-periodic, elongated structures parallel to the magnetic field. The physics that drives the formation of such striations has remained a mystery since their discovery. We have performed a comprehensive numerical experiment testing all possible driving mechanisms, and we have found that the only viable explanation for the appearance of striations is their formation by magnetohydrodynamic waves generating trapped modes, just like vibrations in a resonating chamber: they are, in every sense, a magnetohydrodynamic "song", with dense filaments being the instrument. We have additionally demonstrated that, by examining the spatial power spectrum of striations, we can find the normal modes of the "resonating chamber", and thus derive the true dimensions of dense filaments, including their previously inaccessible by any means line-of-sight dimension. We have applied such a normal mode analysis towards the Musca molecular cloud - one of the best-studied "dense filaments" in the interstellar medium and, contrary to all expectation, we have unequivocally demonstrated that the Musca filament is not, in fact, a filament: it is a sheet-like structure with comparable line-of-sight and plane-of-sky dimensions, seen edge-on. We discuss the implications of this discovery for the physics of dense molecular cloud formation.

Contribution

Talk

Auteur principal: Dr TRITSIS, Aris (Research School of Astronomy and Astrophysics)

Co-auteur: Prof. TASSIS, Konstantinos (University of Crete)

Orateur: Dr TRITSIS, Aris (Research School of Astronomy and Astrophysics)

Classification de Session: S2 Observations and models