Turbulent ISM and star formation in the prototypical Antennae galaxy merger

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The Antennae galaxies (22 Mpc) are a spectacular example of a burst of star formation triggered by the encounter of two galaxies. They are an ideal source to understand how the dynamics of galaxies in mergers trigger the star formation. In the Antennae, most of the newly formed stars are observed in massive clusters (up to 10^7 $M_\odot$), dubbed super star clusters which are potentially the progenitors of globular clusters. In the Antennae, their formation must involve a complex interplay of merger-driven gas dynamics, turbulence fed by galaxy interaction and dissipation of the kinetic energy of the gas.
We will present ALMA CO(3-2) observations and VLT near-IR H2 spectro-imaging observations.The data show that the kinetic energy of the galaxies is not thermalized in large scale shocks, but it drives turbulence in the molecular ISM much stronger than observed in the Milky Way. Near-IR spectral diagnostics show that most of the H2 line emission is shock-powered and traces the dissipation of the gas turbulent kinetic energy. We relate the H2 emission to the loss of kinetic energy required to form gravitationally bound clouds. This interpretation is supported by the discovery of a compact, bright H2 emitter source located where the velocity gradient in the interaction region is observed to be the largest, at the interface of red- and blue-shifted gas. The characteristics of this source suggest that we are witnessing the formation, initiated by turbulent dissipation, of a cloud massive enough to form a super star cluster within ~1 Myr.