

Title: Emission clouds: structure and evolution

Reference number: 176005

We will study dynamics, hydrodynamics and evolution of emission nebulae. The previous results obtained for supernova remnants (SNRs) and planetary nebulae will be improved using new fitting procedures on the latest data samples. For the first time the theoretical and empirical  $\Sigma$ -D relations (which describes the radio evolution) for HII regions will be derived.

The structure of SNRs will be studied by examining spectra of these objects in a continuum. We will try to extract a representative sample of SNRs that have significant contribution of the thermal component in the total radio emission in continuum. The synchrotron mechanism of production of radio emission is dominant, but thermal mechanism should also exist and one of the goals of the project is to identify the thermal radiation. If the thermal component of radiation originates from certain parts of objects, we could improve the description of their structure.

By observations in the optical domain we will try to identify SNRs and HII regions in nearby galaxies. We will also study SNRs in the X-ray domain, as multi-frequency research is required for thorough understanding of the structure of these objects.

Also, we will work on the theory of particle acceleration in the SNRs by strong shock waves, up to energies of cosmic rays. These high energetic particles will interact with the interstellar matter and that will leave a clear imprint on the abundances of deuterium and lithium in the interstellar medium in relatively close environment, which we will try to determine.