Title: Shell-like structures in the ISM: Observation versus simulations

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Abstract: Shell-like structures are objects found in large numbers in the interstellar medium (ISM). They usually appear as bubbles or segments of bubbles and are believed to result from the deposition of mass and energy into the ISM by stars, gamma-ray bursts, or high-velocity clouds. Interstellar turbulence may play a role in their creation too. These structures influence the dynamics of the ISM and are also linked to star formation. In this thesis, I review our current knowledge of the ISM, interstellar turbulence, and shell-like structures in the ISM. Then I present the research into the GLIMPSE bubble N107 conducted in collaboration with my colleagues. N107 is a dusty shell-like structure found in our Galaxy. We explored its atomic, molecular, and radio-continuum components; derived its distance (3.6 kpc), size (radius of 12 pc), and expansion velocity (8 km s^{-1}); and identified 49 associated molecular clumps. Using numerical simulations, we estimated the conditions under which N107 formed and concluded it is probably 1 Myr to 2.25 Myr old. Finally, I describe the code Quickclump that I developed. It is an automated tool that identifies clumps in three-dimensional data. Quickclump was inspired by another clump-finding code called DENDROFIND. Shell-like structures are often associated with molecular clouds and Quickclump can decompose those clouds into individual clumps.

Keywords: ISM: bubbles – ISM: general – ISM: GLIMPSE bubble N107 – methods: data analysis – turbulence

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