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ORIGINAL ARTICLE

A multiwavelength study of the supernova remnant G296.8-0.3

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Abstract We report XMM-*Newton* observations of the Galactic supernova remnant G296.8-0.3, together with complementary radio and infrared data. The spatial and spectral properties of the X-ray emission, detected towards G296.8-0.3, was investigated in order to explore the possible evolutionary scenarios and the physical connexion with its unusual morphology detected at radio frequencies. G296.8-0.3 displays diffuse X-ray emission correlated with the peculiar radio morphology detected in the interior of the remnant and with the shell-like radio structure observed to the northwest side of the object. The X-ray emission peaks in the soft/medium energy range (0.5–3.0 keV). The X-ray spectral analysis confirms that the column density is high ($N_{\rm H} \sim 0.64 \times 10^{22}$ cm^{-2}) which supports a distant location ($d > 9$ kpc) for the SNR. Its X-ray spectrum can be well represented by a thermal (PSHOCK) model, with $kT \sim 0.86$ keV, an ionization timescale of 6.1×10^{10} cm^{-3} s, and low abundance ($\sim$0.12 $Z_{\odot}$). The 24 μm observations show shell-like emission correlated with part of the northwest and southeast boundaries of the SNR. In addition a point-like X-ray source is also detected close to the geometrical center of the radio SNR. The object presents some characteristics of the so-called compact central objects (CCO). Its X-ray spectrum is consistent with those found at other CCOs and the value of $N_{\rm H}$ is consistent with that of G296.8-0.3, which suggests a physical connexion with the SNR.

Keywords ISM: individual objects: G296.8-0.3 · ISM: supernova remnants · X-ray: ISM · Radiation mechanism: thermal · ISM: individual objects: 2XMMi J115836.1-623516

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1 Introduction

It is generally accepted that supernova remnants (SNRs) are the dominant source of Galactic cosmic rays, at least for energies up to 3×10^{15} eV. These objects provide a significant fraction of the mechanical energy that heats, compresses and chemically enriches the interstellar medium (ISM). Therefore, SNRs can be used to investigate global properties of the galaxy as well as the local environment where they evolve. Thanks to significant advances in the angular resolution capabilities of modern X-ray observatories