G55.0+0.3: A Highly Evolved Supernova Remnant

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ABSTRACT

In order to determine the nature of an object identified as a potential supernova remnant (SNR) in a 327 MHz survey of the Galactic plane, continuum observations have been taken at 1420 MHz with resolution identical to that of the survey. Additionally, atomic hydrogen (HI) spectral line data have been taken in order to determine the distance to the object.

Multi-frequency analysis shows that a shell feature in the southern part of this object is non-thermal and confirms earlier studies that identified the northern portion as an HII region. The non-thermal nature of the shell and the absence of infrared flux density confirms the speculation of Taylor, Wallace, & Goss (1992) that this object, G55.0+0.3, is a SNR. From analysis of HI data, the SNR's estimated kinematic distance is 14 kpc, yielding a radius of approximately 70 pc, making it one of the largest known SNRs. The age estimate on the order of one million years exceeds the conventional limits on observable SNR lifetimes in the literature by a factor of five, implying that the radiative lifetimes of SNRs could be much longer than previously suggested.

There is also evidence that the remnant may be associated with the nearby pulsar J1932+2020. This proposed SNR/pulsar association is older than any previously documented by an order of magnitude. If valid, it suggests that searches for associations should not be restricted to the regions about young pulsars.

Subject headings: supernova remnants — ISM: individual (G55.0+0.3, G55.2+0.5, G55.6+0.7 — pulsars: individual (J1932+2020) — radio continuum: ISM

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