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Dust and enrichment in the interstellar medium from young supernova remnants

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Abstract. Supernovae influence the chemistry and physics in the interstellar medium from large scales down to the atomic level. However, we still lack understanding of many of the fundamental processes involved. Supernova remnants can be used to study those processes observationally at multiple wavelengths, ranging from radio to X-rays.

Young remnants are particularly suited to study nucleosynthesis and chemical enrichment, dust formation and destruction, and the physics of shock waves. Here, we focus on the oxygen–rich LMC remnant N132D (SNR 0525-69.6, cf. Fig. 1), using all instruments onboard the *Spitzer Space Telescope*, IRS, IRAC, and MIPS (Infrared Spectrograph, Infrared Array Camera, Multiband Imaging Photometer for Spitzer). We detect bright 24, 70, and possibly 160 μm emission with MIPS. The 5–40 μm IRS spectra toward the southeastern shell show mostly a featureless, steeply rising continuum with weak [NeIII] and [OIV] lines. We also obtained spectra of a fast moving ejecta knot, previously known from optical data, which shows much enhanced [NeIII] and [OIV] line intensities. IRAC images (3–9 μm) do not show clear evidence of emission from the remnant, partly due to confusion with the ambient ISM material. We discuss the implications of the lack of IRAC emission and the bright infrared continuum with respect to dust formation in young SNRs, and present elemental abundance estimates from the analysis of ground state infrared lines. We complement this new *Spitzer* IR data with existing archival data from *ISO*, *CHANDRA* (X-rays), and ground based radio studies.

Keywords. ISM: general, supernova remnants — supernovae: individual (N132D)

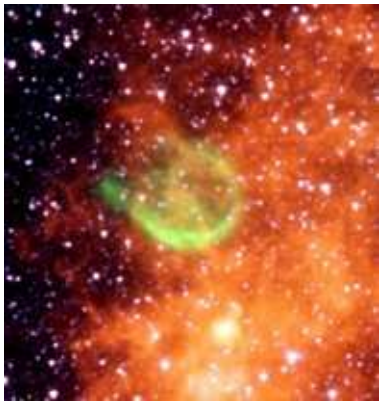

Figure 1. N132D: IRAC 3–9 μm color composite image and MIPS 24 μm superposed in green