Title

RADIAL DISTRIBUTION OF STARS, GAS AND DUST IN SINGS GALAXIES. I. SURFACE PHOTOMETRY AND MORPHOLOGY

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Abstract

We present ultraviolet through far-infrared (FIR) surface brightness profiles for the 75 galaxies in the Spitzer Infrared Nearby Galaxies Survey (SINGS). The imagery used to measure the profiles includes Galaxy Evolution Explorer UV data, optical images from Kitt Peak National Observatory, Cerro Tololo Inter-American Observatory, and Sloan Digital Sky Survey, near-IR data from Two Micron All Sky Survey, and mid- and FIR images from Spitzer. Along with the radial profiles, we also provide multi-wavelength asymptotic magnitudes and several nonparametric indicators of galaxy morphology: the concentration index (C 42), the asymmetry (A), the Gini coefficient (G), and the normalized second-order moment of the brightest 20% of the galaxy's flux (). In this paper, the first of a series, we describe the technical aspects regarding the surface photometry, and

present a basic analysis of the global and structural properties of the SINGS galaxies at different wavelengths. The homogeneity in the acquisition, reduction, and analysis of the results presented here makes these data ideal for multiple unanticipated studies on the radial distribution of the properties of stars, dust, and gas in galaxies. Our radial profiles show a wide range of morphologies and multiple components (bulges, exponential disks, inner and outer disk truncations, etc.) that vary not only from galaxy to galaxy but also with wavelength for a given object. In the optical and near-IR, the SINGS galaxies occupy the same regions in the C 42-A-G-parameter space as other normal galaxies in previous studies. However, they appear much less centrally concentrated, more asymmetric, and with larger values of G when viewed in the UV (due to star-forming clumps scattered across the disk) and in the mid-IR (due to the emission of polycyclic aromatic hydrocarbons at 8.0 μm and very hot dust at 24 μm). In an accompanying paper by Muñoz-Mateos et al., we focus on the radial distribution of dust properties in the SINGS galaxies, providing a detailed analysis of the radial variation of the attenuation, the dust column density, the dust-to-gas ratio, the abundance of PAHs, and the intensity of the heating starlight.

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