Extinction Map Construction and Extinction Law Calculation of M31 and M33

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Interstellar extinction refers to the absorption and scattering of starlight by dust. The multi-band extinction laws are crucial to recover the intrinsic energy distribution of celestial objects and infer the characteristics of interstellar dust. Meanwhile, extinction maps of galaxies contribute to the dust distribution in galaxies and the structure of galaxies and are essential tools to study the stellar population and the star formation history in galaxies.

The current studies of extinction in nearby galaxies are limited to a few galaxies. As a result, there is large uncertainty about the nature and dust distribution, stellar population, and star formation history of nearby galaxies. By introducing the dust model to simulate the effect of dust on stellar radiation innovatively, we: (1) calculate the multiband extinction laws toward more sight lines in M31, M33, and other nearby galaxies with blue supergiants as extinction tracers, and analyze the dust properties in different interstellar environments; (2) construct dust extinction maps of M31 and M33 with member stars as tracers, and analyze the dust distribution in different galaxies; (3) predict the multiband extinction toward different sight lines in nearby galaxies by combining the obtained extinction maps and extinction laws and provide extinction corrections for the observation of the Chinese Survey Space Telescope (CSST) and related scientific objectives.