

The Variations of the Near and Mid-Infrared Interstellar Extinction Laws

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It has been well known that the extinction law changes with interstellar environments in the ultraviolet and visible, which can be characterized by the total-to-selective extinction ratio parameter R_V . However, whether and how the extinction law varies in the near (NIR) and mid-infrared (MIR) is still controversial. Recently, based on the stellar parameters derived from the *SDSS-III*/Apache Point Observatory Galaxy Evolution Experiment (*APOGEE*) spectroscopic survey, we (Xue, Jiang, & Gao, et al., *ApJs*, 224:23, 2016) selected a large samples of G-type and K-type giants as the tracers of the Galactic MIR extinction. We calculated the intrinsic stellar color excesses from the stellar effective temperatures and used them to determine the average NIR and MIR extinction of the entire sky of the Milky Way surveyed by *APOGEE*. In this work, using the same method, we recalculate the intrinsic colors of these *APOGEE* G-type and K-type giants by considering different $[Fe/H]$. Then, the extinction laws in the NIR and MIR are determined for a number of different sightlines surveyed by *APOGEE*. Our results show that the NIR extinction law varies a little with Galactic longitude and latitude, also the extinction depth $E(J-K)$, though it is generally considered as universal. In the *WISE*/3.4, 4.6, and 12 μm bands, and the *Spitzer*/IRAC/[3.6], [4.5], [5.8], and [8.0] μm bands, small variations of the MIR extinction laws are also found with the Galactic longitude and latitude.