The Extinction Law of M31

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Dust extinction is crucial to recover the intrinsic energy distributions of celestial objects and infer the characteristics of the interstellar dust.

The Andromeda galaxy (M31), at a distance of $\sim$ 780 kpc, is the galaxy of which individual stars can be resolved. The extinction law of M31 can be determined in terms of "pair method". Bianchi et al. (1996) found the UV extinction law in M31 shows a MW-type extinction curve but with weaker 2175 Å feature than that in the MW. The extinction curves in the central region of M31 derived by Dong et al. (2014) have the values of $R_{\rm V}$ around 2.4, and are steeper than the average Galactic one. Clayton et al. (2015) constructed extinction curves for four reddened sightlines in M31, which show similarity to those seen in the MW and the Large Magellanic Cloud (LMC). The extinction law of M31 is still unclear, so that the extinction curves towards more different sightlines in M31 are needed.

In this work, we select the bright O-type and B-type giant stars in M31 as extinction tracers from the Local Group Galaxy Survey (LGGS, Massery et al. 2016). By combining the spectroscopic data obtained by the Hubble Space Telescope (HST) and the Large Sky Area Multi-Object Fiber Spectroscopy Telescope (LAMOST) with the photometric data availabled online, we try to derive the extinction law of M31 from UV to near-IR bands for more sightlines.

Similar to the method used by Clayton et al. (2015), we use the Tlusty stellar atmosphere model to obtain the intrinsic surface fluxes for our extinction tracers. However, instead of adopting the FM (Fitzpatrick & Massa, 1990) parameterized extinction curves used by Clayton et al. (2015), we use the theoretical extinction curves derived from the silicate-graphite dust model with a MRN (Mathis, Rumpl & Nordsieck, 1977) dust size distribution.