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P19 Study of the interstellar gas distribution of the Milky Way using Gamma-Ray Burst afterglow

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Accurately measuring the interstellar medium (ISM) gas distribution is important to study the structure and evolution of the Milky Way. Usually, the ISM gas is traced by HI 21-cm line surveys and CO 2.6-mm surveys.However, a significant amount of gas not properly traced by these surveys has been reported recently (dark gas). Although the emission from dust mixed with the ISM gas is usually used to trace the dark gas, the procedure has not been established yet, introducing the uncertainty of the ISM gas distribution. Therefore, we aim to accurately estimate the column density distribution of the ISM gas in the Milky Way using Gamma-Ray Burst (GRB) afterglow data. Because the X-ray absorption of the afterglow does not depend on the gas states such as the temperature, we can accurately estimate the ISM gas column density. For this purpose, we analyzed GRB afterglow data by Swift/XRT toward various directions of the Milky Way and measured the total column density. We then compared several models of the Galactic ISM gas column density with the intrinsic column density (total minus Galactic ISM gas column density); the intrinsic column density should not depend on the Galactic gas column density.Compared to the previous study (Willingale et al. 2013), we employed newly available dust emission models (radiance and optical depth at 353 GHz) by Planck satellite and increased the number of GRB events by more than a factor of two(about 1000 in total).We divided GRB data into several groups by their position and the GRB type (short-GRB or long-GRB), and applied a correction on the Galactic column density model with the dust temperature if necessary.In this contribution, we report details of the analysis and obtained results.

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