

Far-infrared Observation of the Near-Ecliptic Asteroidal Dust Band and Its Origin

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The zodiacal emission is the thermal emission from the interplanetary dust widely distributed in the solar system. It is the dominant diffuse radiation in the mid- to far-infrared (IR) wavelength region except near the Galactic plane. It was found that there are many small-scale structures in the zodiacal emission distribution, including dust band pairs at the ecliptic latitudes of $\pm 1.4^\circ$, $\pm 2.1^\circ$, and $\pm 9.3^\circ$, apart from a smooth background distribution. These three major dust-band pairs are now considered to be associated with the Beagle, Karin, and Veritas asteroid families, respectively. It is thought that disruption events in the main asteroid belt, which would have occurred within the last 10 Myrs, are major supply sources of dust particles. Although the $\pm 2.1^\circ$ and $\pm 9.3^\circ$ bands are well studied, there are not enough observations for the $\pm 1.4^\circ$ bands.

We investigate the geometry of the $\pm 1.4^\circ$ and $\pm 2.1^\circ$ dust-band structures in the far-IR all-sky maps observed with the Japanese infrared satellite AKARI. AKARI clearly detects the both dust-band structures at $90 \mu\text{m}$. AKARI's observations detected the $\pm 1.4^\circ$ band structure over a wide Ecliptic longitude region, which strongly supports the Beagle family origin.