Contribution ID: **127**

Type: **Poster**

Studying the Amorphous Material Physics of the Cosmic Dust Grains by Fitting the Observed Intensity and Polarization SEDs in Millimeter, Submillimeter and Far-infrared Wavebands

Wednesday 13 June 2018 14:43 (1 minute)

The Galactic dust emission is a main obstacle to detect the cosmic microwave background (CMB) B-mode polarization signals originated from primordial gravitational waves. Accurate removal of the Galactic dust emission from the data is crucial for the success. Although a single power law frequency dependence has been usually assumed both for the dust emissivity and polarization SEDs, they might have complex frequency dependences. The deviation of the observed spectrum indexes of the Galactic dust emission in mm and submm wavebands from the spectrum index of the crystal is one of the strong evidences which support that main constituent of the Galactic dust grains is amorphous material. Therefore, we have been working on construction of the physically motivated Galactic dust SED models both for intensity and polarization from mm to FIR wavebands based on the physical properties of the amorphous material. Anomalous temperature dependences of heat capacity and heat conductivity of amorphous solids appeared in very low temperature environment support that the low temperature material physics of the amorphous is well described by the two-level systems (TLS). The complex dielectric constants and heat capacities of the amorphous dust grains are modeled by the combination of the TLS model and the crystal dust grain. Dust SEDs are calculated with our own Monte Carlo simulation code to follow thermal history of dust grain in which the physical characteristics of amorphous material is taken into account. We have constructed the scheme how to constrain the physical parameters of the amorphous dust grains by fitting both intensity and polarization observational SEDs in mm and submm wavebands. Our method is applied to intensity and polarization data of M31 obtained by Planck as for testing our scheme. We report these results.

Consider for a poster?

Yes

Primary author: NASHIMOTO, Masashi

Co-author: Prof. HATTORI, Makoto (Tohoku University)

Presenter: NASHIMOTO, Masashi

Session Classification: Poster Presentations

Track Classification: What is dust?