Imaging Polarimetry of Disks around Herbig Ae Stars

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Dusty disks around young stars are the sites of planet building, and hence observations to determine their nature is essential to understand how planets form. Imaging polarimetry allows us to better constrain the disk geometry and to explore the properties of dust such as grain size and composition. In addition, polarimetric differential imaging is a powerful technique to extract the scattered light from the disk by suppressing the unpolarized stellar light.

We present the spatially-resolved polarization measurements for the disks around Herbig Ae stars, HD 142527 and AB Aur. The images were obtained in the near-infrared wavebands using adaptive optics on Subaru Telescope. HD 142527 has a peculiar disk structure with a large ($r \sim 100$ AU) inner cavity. The polarization is stronger in the north-east region than in the south-west, suggesting that the large polarization is produced in the far side of the disk, at the vertically thick inner wall. The inner ($r \gtrsim 30$ AU) disk around AB Aur was resolved using the new coronagraphic camera HiCIAO, revealing the complex emission or gap features in polarized light. We discuss the possible mechanisms that can reproduce such features and might lead to planet formation, as well as the color of the scattered light.

Keywords: Protoplanetary disks; Infrared observations; HD 142527, AB Aur