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Current status of Subaru Strategic Exploration of Exoplanets and Disks (SEEDS)

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From the space- and ground-based survey for exoplanets, the number of planets are going to exceed 3,000, including candidates. These discover lead us to variety of planets which called hot-Jupiter, hot-Neptune and super-Earth. However our understanding of planetary systems and their formation is far from complete. A census of companions to stars over a wide range of ages will provide important clues to the formation and evolution of stars, brown dwarfs, and plants.

SEEDS is the first Subaru Strategic Observations to conduct the high contrast camera HiCIAO with 188 elements Adaptive Optics (AO188) imaging survey searching for giant planets as well as protoplanetary/debris disks at a few to a few tens of AU regions around ˜500 nearby solar-type or more massive young stars. The ages of our exoplanet target stars span ˜1-10 Myr for YSOs in nearest star forming regions, through ˜100-500 Myr old stars in nearby open clusters, to ˜1 Gyr old nearby stars. The protoplanetary disk targets are the YSOs in nearby star forming regions, while the debris disk candidates include both well known and newly discovered ones from Spitzer/AKARI satellites.

As demonstrated with one of recent successes of direct imaging of proto-planetary disks, we revealed the geometry of the disk of young (˜10Myr) YSO, AB Aur. The disk structure shows the rich features and most inner part of the disk. Another recent success is the imaging for HR 4796 A their debris ring. The ring features imply existence of unknown inner planets. Previous observations shows simple disks but HiCIAO+AO188 revealed their complex disk structures which imply inner unknown planets. These results lead us to be connecting the planet formation research field and proto-planetary research field, which fields went on apart previously.

SEEDS project observations are from September 2009 to 5 years. The interesting results are increasing, in the first half our project time. In this talk, I would like to present about the middle status report not only disks but also direct detection of planet mass objects.

Keywords: Exoplanet, Proto-planetary disk, Near infrared, Direct imaging