1 Introduction

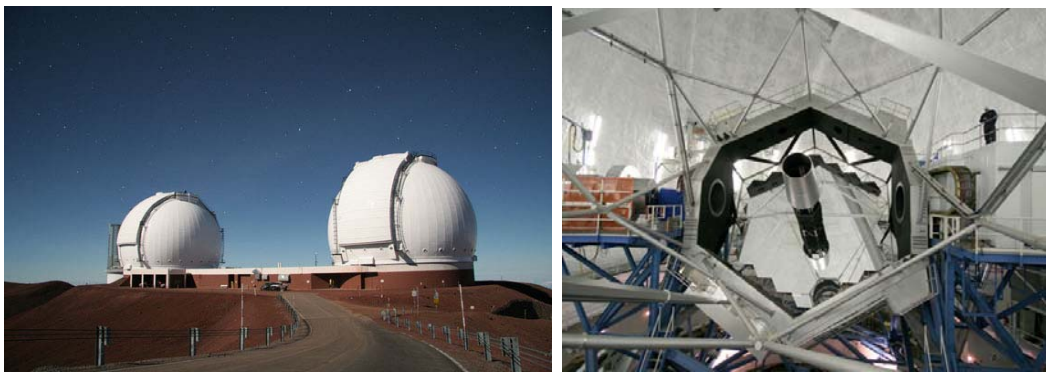

Fig. 1. *Left*: The domes of the two telescopes of the W. M. Keck Observatory atop Mauna Kea, Hawaii. The telescopes are separated by 85 m and make up the Keck Interferometer. *Right:* One of the segmented 10 m primary mirrors.

The Keck Interferometer (KI, Fig. 1) combines the two 10m Keck telescopes with a baseline separation of 85m to simulate a large telescope diameter in terms of angular resolution. The resulting resolution of 5 mas at 2.2 μm is slightly better than the diffraction limit of the $\sim$ 30 m diameter next generation of ground-based telescopes currently under development. Long baseline interferometers prevail in areas of research where the highest angular resolution is required together with only limited demands on sensitivity and imaging information, e.g. such as resolving circumstellar shell and disk emission to understand the formation of gas and dust therein. Co-phased arrays provide already today a glimpse onto discoveries of the next generation of large ground-based telescopes. In particular the interferometric narrow-angle astrometry, the central topic of this workshop, is a field with long-term prospects for interferometric research. The opto-mechanical complexity of the imaging process of 30 m telescopes (see Gilmozzi et al., 2008, for current plans) will make it difficult to match and outperform the high precision of *interferometric* astrometry with *imaging* astrometry.

The KI is one of the two large aperture optical long baseline interferometric (OLBI) facilities in the world. Funded by NASA, the KI is developed and operated by JPL [1], NExScI [2] and the W. M. Keck Observatory (WMKO [3]). The KI has been utilized for studying a range of astrophysics, including young stellar object disks and the first infrared interferometry observations of an AGN. Recent developments include the addition of nulling interferometry and improved sensitivity (Colavita et al., 2008). For more information about us-

[1] **J**et **P**ropulsion **L**aboratory; `http://planetquest.jpl.nasa.gov/Keck/keck_index.cfm`

[2] **N**ASA **Ex**oplanet **Sc**ience **I**nstitute, the former Michelson Science Center (MSC) is an integral part of NExScI; `http://nexsci.caltech.edu`

[3] http://keckobservatory.org

ing KI, its current limiting magnitudes, and target requirements, see the KI performance information at the NExScI/MSC support page [4] .

A new major development effort is underway to broaden the astrophysical applications of this unique instrument: the ASTRA upgrade. ASTRA stands for the ASTrometric and phase-Referenced Astronomy upgrade of the KI project. ASTRA is funded by the National Science Foundation (NSF) Major Research Instrumentation (MRI) program and will be implemented in three steps over the next 2 years. Besides the NSF engagement, a number of science institutes contribute to the ASTRA collaboration to advance and profit from large-aperture OLBI (UC Berkeley, UCLA, Caltech, NExScI, JPL, University of Arizona).

References

Gilmozzi , R., & Spyromilio, J. 2008, Proc. SPIE, 7012, 701219

Colavita , M. M., Serabyn, E., Booth, A. J. et al. 2008, Proc. SPIE, 7013, 70130A

[4] http://msc.caltech.edu/software/KISupport