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Observational cosmology with thirty meter telescope

Thirty meter telescope (TMT) 1 is a project to construct a next generation telescope with 30 m primary mirror and adaptive optics to enhance its vision to the diffraction limit. Currently, California Institute of Technology, University of California, ACURA (Canada), NAOJ (Japan), NAOC (China) and ITCC (India) are full members of the TMT International Observatory (TIO) founded in 2014. TMT is built around the legacies of segmented mirror technology of Keck telescope, Subaru Telescope 2-3 structure and control technology, and laser guide adaptive optics system to be developed by TMT consortium. Upon completion, TMT will have 13 times finer spatial resolution than the Hubble space telescope and 10 times larger light collecting power of Keck telescope. With this tremendous new power, astronomers are expecting to challenge various big questions. 1) To probe the first generation of stars and galaxies those were formed in the early Universe and elucidate the history of cosmic re-ionization and structure formation. Subaru Deep Field survey 4-6 was one of the successful predecessors in this field to spot galaxies at 13 billion light years away and witnessed the epoch of the last phase of cosmic re-ionization; 2) to study extra-solar planets 7 and probe their atmosphere to see if there is any evidence for bio-markers. Several exoplanets are already imaged by using adaptive optics and coronagraph technique on 8 m telescopes; and 3) to start monitoring the redshift variation of objects at various epochs to measure the cosmic expansion history. Though very challenging, this could provide a firm basis to study the nature of the dark energy, which is supposed to exist from supernova cosmology and from the analysis of microwave background radiation. I will talk on these topics using illustrative slides and videos.

Biography

Masanori Iye has done his PhD in Astronomy from University of Tokyo in 1978. He started his career as Research Associate in University of Tokyo and was promoted to an Associate Professor at Tokyo Astronomical Observatory of University of Tokyo in 1986. He became a Professor at National Astronomical Observatory in 1993 and retired in 2014. He is now serving for NAOJ as the Japan Representative of TMT International Observatory Governing Board. During his career, he has served as a Project Scientist to design and construct 8 m Subaru Telescope at Maunakea Hawaii and has developed a laser guide star adaptive optics system to enhance its vision. His group found a galaxy at 13 billion light years away in 2006 and identified the epoch of cosmic re-ionization. He was awarded the Japan Academy Prize (2013), Imperial Medal with Purple Ribbon (2011), Toray Science and Technology Prize (2011), Nishina Memorial Prize (2008) and many other honors.

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