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Robotic Surveys of Habitable Earth-like Planets and Follow-ups of High Redshift Gamma Ray Bursts

Prof. Jian Ge (University of Florida)

Dr. Jian Ge is a professor of astronomy at University of Florida. He was a University of Florida Research Foundation Professor in 2010-2013. He was an assistant professor at Department of Astronomy and Astrophysics of Penn State University in 2000-2004 before he joined UF as a tenured professor in 2004. He obtained his Ph.D in Astronomy at the University of Arizona in 1998 and his BS in theoretical physics at University of Science and Technology of China in 1989. He is the Principal Investigator of the MARVELS survey of the SDSS-III program in 2008-2014. He is the PI for the EXPERT, LiJET and EXPERT-III optical Doppler instruments and also FIRST near IR Doppler instrument. He led the development of the first silicon grisms, large format silicon immersion gratings and the Sine interferometric calibration source. He also led the development of the advanced image slicer integral field optics, and new generation coronagraphic image and pupil masks for TPF. His team discovered two new planets, sixteen brown dwarfs and hundreds of new binaries, and confirmed two transit planets. His team also discovered over 400 high redshift quasar 2175 Å dust absorbers, planetesimal infall around a young star, a protoplanetary disk, and molecular hydrogen in four high-redshift damped Lyman alpha quasar absorbers, and measured high redshift Cosmic Microwave Background Radiation temperatures.

Abstract

One of the most astonishing results from the HARPS and Kepler planet surveys is the recent discovery of close-in super-Earths orbiting more than half of FGKM dwarfs. This new population of exoplanets represents the most dominant class of planetary systems known to date, is totally unpredicted by the classical core-accretion disk planet formation model. High cadence and high precision Doppler spectroscopy is the key to characterize properties of this new population and constrain planet formation models.

A new robotic, compact high resolution optical spectrograph (EXPERT-III, R=100,000, 0.38-0.9 microns) and a near infrared high resolution spectrograph (FIRST) (R=50,000, 0.8-1.8 microns) have been recently commissioned at the Automatic Spectroscopic Telescope robotic telescope at Fairborn Observatory in Arizona this year and has produced on-sky science verification data. The early RV measurements show that this instrument is approaching a Doppler precision of 1 m/s (rms) for bright reference stars and better than 3 m/s daily RV stability. These instruments will be used to launch a high cadence and high precision survey of close-in super-Earths around ~200 nearby FGKM dwarfs and look for habitable Earth-like planets around K and M dwarfs in 2014-2017. A future addition of a fiber-fed integral field unit (IFU) in FIRST will open up a 3-D NIR imaging spectroscopy capability. The fast response of the 2m robotic telescope with the IFU mode is ideal for capturing gamma ray bursts at z~6-13 during its brightest phase to probe the first generation star formation and also intergalactic medium during the re-ionization era.

All are welcome! Tea, coffee, biscuits will be served at 2:15 P.M.