EE Department Seminars

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Yorgo Istefanopulos Meeting Lounge (KB 217)

Space Telescopes for Direct Detection of Exo-Planets

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Abstract:

NASA Exoplanet Exploration Program missions represent a voyage of unprecedented scope and ambition, promising insight into humankind's most timeless questions: *Where did we come from? Are we alone?*

The primary goal of these interrelated missions is to discover and characterize planetary systems and Earth-like planets around nearby stars. The missions are designed to build on each other's success, each providing an essential step forward toward the goal of discovering habitable planets and evidence of life beyond.

The evidence will be primarily in the form of detailed spectroscopic studies of the atmospheres of extrasolar planets. For a planet to host life, the expectations are that the planet would resemble Earth itself. It would lie in an orbit that is neither too close nor too far for from its star, so that liquid water could exist over geological timescales, and its atmosphere would contain the right balance of gasses that could support life. Moreover, the atmosphere of the planet would be altered by the presence of life, such that only the existence of living organisms could account for the unusually high levels of gasses in its atmosphere.

One type of space telescopes that can be used to find exo-planets is the Terrestrial Planet Finder (TPF), currently under study by NASA. It comprises a suite of two complementary observatories that would study all aspects of planets outside our solar system: from their formation and development in disks of dust and gas around newly forming stars to the presence and features of those planets orbiting the nearest stars; from the numbers at various sizes and places to their suitability as an abode for life. After an extended period of study and evaluation, NASA in April 2004 decided to move forward with TPF as a suite of two complementary architectures: a visible-light coronagraph and a mid-infrared formation-flying interferometer.

I have got involved in the studies and the performance evaluation of the TPF Coronograph (TPF-C) designs for 4+ years. In this talk, I will give an overview on the issues related to finding exo-planets and on some space telescopes including TPF-C

Short Bio:

Dr. Erkin Sidick was born in Aksu city of Eastern Turkistan located in the north-western part of China. After earning his BS degree in Electrical Engineering, he worked as a teacher at Xinjiang University from Feb. 1983 to Sep. 1985. During this time he spent one year at Shanghai Jiaotung University as a domestic visiting scholar, and studied electro-magnetics and micro-wave technology. In Sep. 1985, Dr. Sidick went to Osaka Electro-Communication University of Japan as a research associate, where he conducted research on micro-wave and mm-wave layered ferrite slab waveguide devices. In Sept. of 1988 he went to the USA to earn his graduate degrees.

Dr. Sidick earned his Master's degree in Physics in May 1990 from California State University at Northridge, and his PhD degree in electrical engineering with an emphasis on nonlinear optics in 1995 from the University of California at Davis. After engaging in research at UC Davis and Sandia National Lab (CA) as a post-doc for one and a half years on laser traps and nonlinear optical devices, he worked in 3 different companies in Silicon Valley of California in Research and Development as well as in managerial roles in various fields of optics, especially on passive optical components. He joined NASA Jet Propulsion Laboratory, California Institute of Technology, in January 2004 as a Senior Optical Engineer and is working on the integrated modeling and metrology of Terrestrial Planet Finder Coronagraph (TPF-C) and other space telescope projects. He has co-authored over 70 publications including journal papers, book chapters, and conference presentations, and has 3 patents.