Advanced Instrumentation Seminars

May 30, 2007
1:30 pm, 1st Floor
Kavli Auditorium

Instrumentation for Optical and Infrared Telescopes

Guest Speaker –
Kirk Gilmore
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Since the inception of research in astronomy nearly 400 years ago, there has been a need to study fainter and fainter objects that has led to telescopes of larger and larger diameter and instrumentation of higher and higher precision. We also live in an age when, for the first time, the fields of physics and astronomy are becoming inextricably linked. Modern physicists are becoming increasingly reliant on the ultimate particle accelerator, the Big Bang, to understand the nature of matter and energy under the most extreme conditions. The path physicists must take in this quest is being paved, in part, by astronomical observations.

For the most part, a typical astronomical instrument is a one-of-a-kind highly specialized assemblage of optics, mechanisms, electronics and control systems that work together as a system to capture information in the focal plane of a telescope and translate it into the images and spectra astronomers use everyday to explore the universe. Most instruments are built within relatively small labs, located in universities or various research institutions while most astronomical detectors are built by commercial entities. While it is fair to say that most established commercial providers of instrument components and detectors have a reasonable understanding of the astronomical community as a business client, it is important to convey to them and the rest of the physics and astronomical communities what the current trends are with astronomical instrumentation and extrapolate to the extent practical future trends in astronomy that will impact development plans of instrumentation and detector technology.

I will review optical and infrared telescope, instrumentation and detector evolution and illustrate how technological advances in these areas have produced many important discoveries and, with new telescopes and instrumentation in the design stages today, what lies ahead. Telescope sensitivity and angular resolution, spectroscopic and imaging instrumentation, and detector technology in both the optical and infrared bands will be reviewed.

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