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Space Telescopes and Instrumentation 2012: Optical, Infrared, and Millimeter Wave

Mark C. Clampin
Giovanni G. Fazio
Howard A. MacEwen
Jacobus M. Oschmann, Jr.
Editors

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Introduction

A broad range of optical, infrared, and millimeter wave space telescopes and instruments are enabling a dramatically increased understanding of the origin and structure of the universe, the numbers and characteristics of exosolar planets, and other questions of profound astrophysics importance. The same foundational instrument technologies are also providing increasingly detailed solar studies and enabling new lunar and planetary missions. This conference, part of a continuing series of biannual symposia, was structured to provide a broad overview of these concepts and technologies, including performance and early results from recently launched systems, status reports on planned systems, and insights into new technologies and concepts for future systems.

The conference consisted of a total of 96 oral presentations divided among 19 sessions that were conducted over a total of six days. These were supplemented by a one day poster session that included 87 poster presentations.

Currently active and planned missions addressed within the conference included:

- Astrophysics: Current and recent missions included Hubble, Spitzer, AKARI, and Herschel. Planned missions under active development included GAIA, JWST, WFIRST, EUCLID, EChO, and several Explorer class missions.
- Solar System Missions: SOHO, SOLAR-C, and Rosetta.

The Conference explored the current state of the art of space telescope and observatory concepts, technologies from the visible through the infrared to millimeter wave. The meeting elicited ideas responsive to current risks and opportunities. Papers were presented that addressed multiple topic areas, including the following:

- Optical, IR, and millimeter wave astronomical space telescopes and instruments including their on-orbit performance:
  - Concepts and technologies for exoplanet detection and characterization
  - Approaches to increasing insight into dark matter and dark energy and the origin, evolution, and structure of the universe
- Innovative telescopes and instrumentation for solar system studies:
  - Solar astrophysics
  - Structure and evolution of the constituent bodies, large and small, of the solar system
- Highly innovative space telescope and instrument concepts
- Smaller and more affordable mission concepts:
  - Technology demonstrations
  - Expanded performance of space telescopes against additional science questions

    - Life cycles and costs that support student involvement while producing valuable science
- Enabling subsystem and component technologies for space telescopes, such as:
    - Innovative real time metrology and wavefront sensing and control
    - Technologies and architectures for achieving high thermal stability of large telescopes
    - New detector and sensor technologies
    - Enhanced spectrometers
    - Coating technologies
- Approaches that leverage results and programs in other areas:
    - Balloon and sounding rocket astronomical observatories and instruments
    - Synergism with science missions in other spectral regions
    - Earth observation concepts and technologies
- Systems engineering for space telescopes, to include:
    - System modeling of telescopes and space observatories and simulations of their performance
    - Ground fabrication, integration, and testing of telescopes, instruments, and complete telescope structures and observatories

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