Astro2010
Progress Report

Roger Blandford, *Chair*

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THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

Astro 2010

Committee on Astro2010

Roger Blandford, Chair, Stanford University
Lynne Hillenbrand, Executive Officer, California Institute of Technology

Subcommittee on Science

Martha P. Haynes, Vice Chair – Science Frontiers, Cornell University
Lars Bildsten, University of California, Santa Barbara
John E. Carlstrom, The University of Chicago
Fiona A. Harrison, California Institute of Technology
Timothy M. Heckman, Johns Hopkins University
Jonathan I. Lunine, University of Arizona
Juri Toomre, University of Colorado at Boulder
Scott D. Tremaine, Institute for Advanced Study

Subcommittee on State of the Profession

John P. Huchra, Vice Chair – State of the Profession, Harvard-University
Debra M. Elmegreen, Vassar College
Joshua Frieman, Fermi National Accelerator Laboratory
Robert C. Kennicutt, Jr., University of Cambridge
Dan McCammon, University of Wisconsin-Madison
Neil de Grasse Tyson, American Museum of Natural History

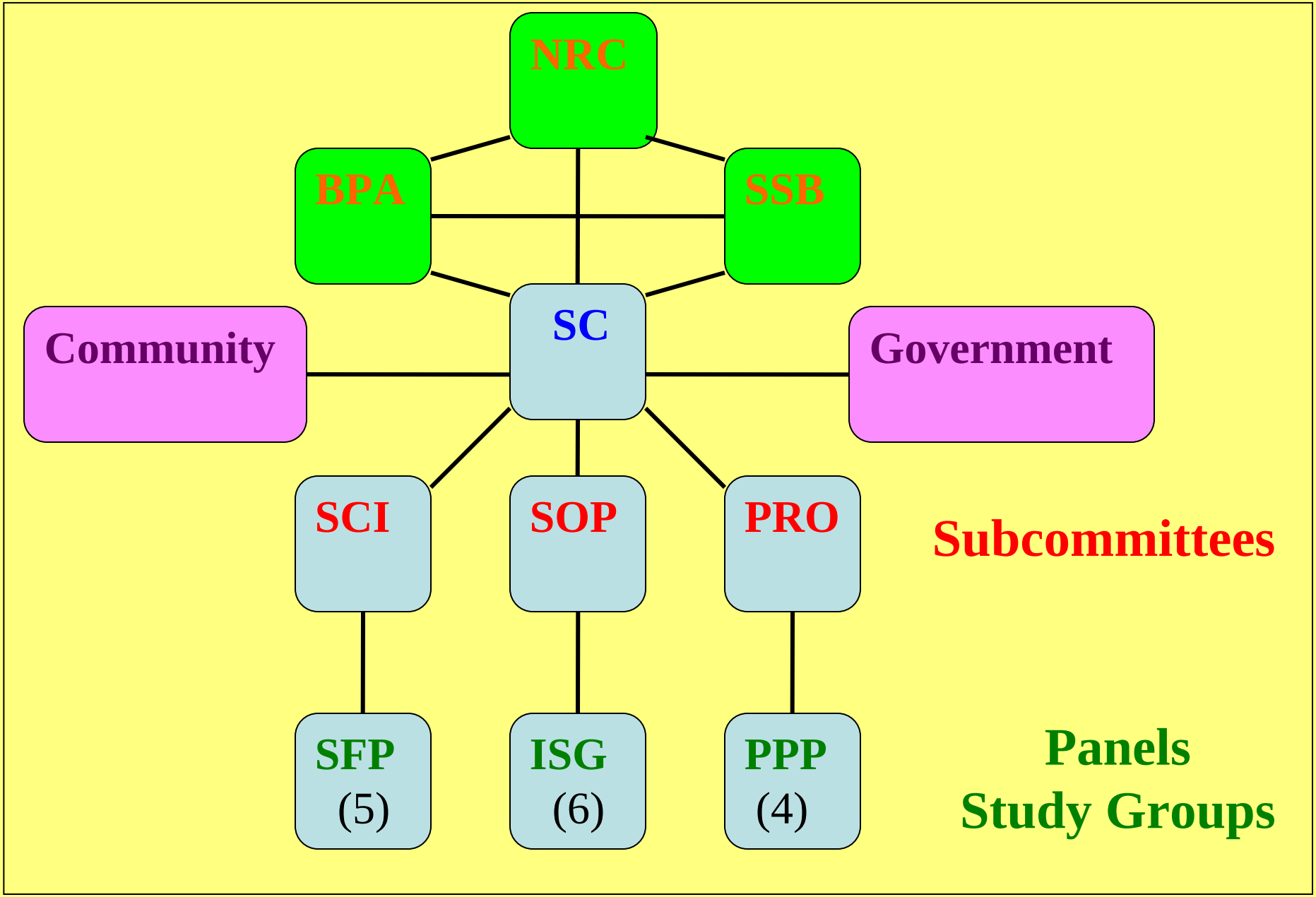
Subcommittee on Programs

Marcia J. Rieke, Vice Chair – Program Prioritization, University of Arizona
Steven J. Battel, Battel Engineering
Claire E. Max, University of California, Santa Cruz
Steven M. Ritz, NASA Goddard Space Flight Center
Michael S. Turner, The University of Chicago
Paul Adrian Vanden Bout, National Radio Astronomy Observatory
A. Thomas Young, Lockheed Martin Corporation [Retired]

Astro2010 Charge

- **The Astro2010 committee will survey the field of space- and ground-based astronomy and astrophysics, recommending priorities for the most important scientific and technical activities of the decade 2010-2020.**

- **The principal goals of the study will be to carry out an assessment of activities in astronomy and astrophysics, including both new and previously identified concepts, and to prepare a concise report that will be addressed to the agencies supporting the field, the Congressional committees with jurisdiction over those agencies, the scientific community, and the public.**


NRC
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Subcommittees
Panels
Study Groups

Calls for Input

The Astro2010 Survey Committee, through its Subcommittees, has issued a series of calls for information. More detail on these calls is available on the Astro2010 web site.
www.nationalacademies.org/astro2010

Recent calls include:

- **Notice of Interest from Activities (now closed – inputs are posted)**
- **Science White Papers: Feb 9 to Feb 15, 2009 (now closed - inputs to be posted)**
- **State Of The Profession Position Papers: Feb17 to Mar 15, 2009.**
- **Technology Development White Papers: Mar 16 to Mar29, 2009**

Future calls will include a request for information from activities.

Community input is welcome at any time by emailing astro2010@nas.edu

Science Frontier Panels

Planetary Systems and Star Formation (PSF), Lee Hartmann

- Solar system bodies (other than the Sun) and extrasolar planets, debris disks, exobiology, formation of individual stars, protostellar and protoplanetary disks, molecular clouds and the cold ISM, dust, and astrochemistry.

Stars and Stellar Evolution (SSE), Roger Chevalier

- The Sun as a star, stellar astrophysics, structure and evolution of single and multiple stars, compact objects, supernovae, gamma-ray bursts and solar neutrinos. Extreme physics on stellar scales.

The Galactic Neighborhood (GAN), Mike Shull

- Structure and properties of nearby galaxies including the Milky Way and their stellar populations, interstellar media, star clusters. Evolution of stellar populations.

Galaxies across Cosmic Time (GCT), Meg Urry

- Formation and evolution of galaxies and galaxy clusters, active galactic nuclei and QSOs, mergers, star formation rate, gas accretion, global properties of galaxies and galaxy clusters, supermassive black holes.

Cosmology and Fundamental Physics (CFP), David Spergel

- Early universe, microwave background, reionization and galaxy formation up to virialization of protogalaxies. Large scale structure, intergalactic medium, determination of cosmological parameters, dark matter, dark energy. High energy physics using astronomical messengers, tests of gravity, physical constants as determined astronomically.

Science White Papers

- Received over 320 papers spanning astronomy and astrophysics with a broadly representative set of authors.
- The papers will be read by one or more panels as they identify how understanding of astronomical frontiers may be advanced in terms of critical questions and specific opportunities.
- Scope of science panels is inclusive, connections to other areas of science are important
- The papers will be made public on the NAS website within days.

Infrastructure Study Groups

Computation, Simulation, & Data Handling (CDH)

- Computational resources and support for analysis and archiving of astronomical data; resources and support available for astrophysical and cosmological simulation; major challenges and changes in computing environments and software; expected availability of computing capability over the next decade.

Demographics (DEM)

- Numbers of astronomers and astrophysicists working in different environments and subfields; diversity, geography and student populations; breakdown of resource allocation by field, discipline and cost category where possible; subscription rates for programs; publication rates.

Facilities, Funding and Programs (FFP)

- List major operational public and private facilities, their capabilities, ages, and proposal pressure; budgets for all agency programs; infrastructure issues such as support for laboratory astrophysics and technology development and theory.

International and Private Partnerships (IPP)

- Lessons learned; scope and current status of relevant major projects in development; summarize lessons learned to promote successful collaborations.

Education & Public Outreach (EPO)

- Public communication programs; astronomy in K-12 and college education; professional education for astronomers, journalists and science policy experts.

Astronomy & Public Policy (APP)

- Benefits to the nation that accrue from federal investment; contributions made to important research of societal importance; current structure of committees and reporting lines that are used to provide advice to the federal government.

State of the Profession Position Papers

- The State of the Profession Subcommittee invites position papers to be submitted to inform the work of the Infrastructure Study Groups as well as the broader work of the Astro2010 Committee.
- Papers should focus on broad general themes related to the state of the profession, such as:
  - data and information on the need for broad support for theory, for laboratory astrophysics, computation;
  - generic technology development;
  - training of observers and instrument builders,
  - relevance of public outreach and astronomy education
  - support both general and specific areas in astronomy and astrophysics,
  - national facilities and any other topic covered in the six broad areas being studied by the infrastructure study groups.
- The papers should provide the data and information (with sources clearly given) on assessments made by the authors.

- 10pp; submit Feb 17 - Mar 15, 2009; public documents

Programmatic Prioritization Panels

Radio, Millimeter and Submillimeter from the Ground (RMS)

- Observatories and telescopes that observe primarily in these wavebands

Optical and Infrared Astronomy from the Ground (OIR)

- Observatories and telescopes that observe primarily in these wavebands

Electromagnetic Observations from Space (EOS).

- All space-based astronomical projects observing the electromagnetic spectrum.

Particle Astrophysics and Gravitation (PAG)

- All projects exploring areas at the interface of physics and astronomy such as gravitational radiation, TeV gamma-ray astronomy, and free-flying space missions testing fundamental gravitational physics.

Activity Notices of Intent

- A counting of activities the survey might consider – used for planning purposes.
- "Activity" – projects, missions, telescopes, laboratories etc.
- Program Subcommittee will decide which activities will be invited to make presentations following a further request for information.
- All 172 NOI inputs received are now listed on the Astro2010 web site.
- If you have not submitted an NOI this does not preclude your responding to the next request for information from activities expected in mid-late February.

Technology Development White Papers

- The Program Prioritization Panels (PPPs) invite interested parties from the broad community to submit white papers focusing on how developing technologies in the upcoming decade will enable advances in astronomy in the future.
- White papers should be submitted to one of the four discipline PPPs or to the Programs Subcommittee for technologies relevant to more than one area or to very broad areas.
- White papers should specifically and succinctly address how the suggested technology studies in the decade 2010-2020 will facilitate new astronomical discoveries in the future.
- 10pp; submit 16-29 March; public documents

Request for Information

- The Program Prioritization Panels (PPPs) will shortly issue a Request for Information (RFI) on Activities (due by April 1).
- Activities are missions, telescopes, laboratories, specific technology development programs, etc.
- The RFI will request information needed for the prioritization process. Invitations to present to the panels at meetings in June will follow.
- A second round of the process will feature the assessment of the costs of construction and full operations, including the support of the science, and the identification of risk.
- The panels and committee will be assisted by independent contractors and consultants in the assessment process.

Astro2010 2009 Key Dates and Milestones

February 9-15, 2009	Submission window for Science White Papers
February 17 – March 15, 2009	Submission window for State of the Profession Position Papers
February 27/28, 2009	SFP: The Galactic Neighborhood: First Meeting (Irvine CA)
March 2/3, 2009	SFP: Cosmology and Fundamental Physics: First Meeting (Wash, DC)
March 2/3, 2009	SFP: Galaxies Across Cosmic Time: First Meeting (Washington, DC)
March 9/10, 2009	SFP: Stars and Stellar Evolution: First Meeting (Washington, DC)
March 12/13, 2009	SFP: Planetary Systems and Star Formation: First Meeting (Wash, DC)
March 16-29, 2009	Submission window for Technology Development White Papers
March 28/29, 2009	SFP: The Galactic Neighborhood: Second Meeting (Washington, DC)
Mar/Apr, 2009 [TBC]	Remaining second meetings of the SFPs
April 1, 2009	Deadline for Submission of responses to RFI (issued mid Feb)
April 17/18, 2009	SFP: Stars and Stellar Evolution: Second Meeting (Irvine CA)
May 4th/5th	Astro2010 town meeting and invited sessions at APS Meeting (Denv, CO)
May 11, 2009	Closed summit meeting of Survey Committee, SFP chairs, ISG chairs, and all PPP members (Irvine CA)
May 12/13, 2009	First meeting of the 4 PPPs (Irvine CA)
May/Jun/Jul, 2009 [TBC	Final meetings of SFPs
June 8-11, 2009	Second meeting of the PPPs (Pasadena CA)
Jul/Aug/Sep, 2009 [TBC]	Final meeting of the PPPs
Sept-Dec, 2009 [TBC]	Fourth and Fifth Survey Committee meetings

Questions and Topics for Discussion (1/2)

- So that we can improve letting the community know how the survey is proceeding and how the community can be involved, do you have any suggestions regarding: 1) the information flow outward from the survey committee via the Astro2010 web site plus chair's bulletins on the one hand, and 2) the written input opportunities plus town hall meetings such as this one, on the other?

- What do you think are the most important criteria for making choices about activities?

- Within the coming decade, what balance of resources should be devoted to short term opportunities -- those that can be realized in less than a few years -- versus longer term, larger, and generally more expensive ventures?

- What is the role of work such as technology development, theory, laboratory astrophysics, data analysis, data dissemination, data archiving, and database mining? Relative to pushing forward on the decade's recommended starts, what balance of resources should be devoted to these efforts for next decade's missions/telescopes, projects, and science?

Questions and Topics for Discussion (2/2)

- Part of the charge to the survey committee is to recommend how the agencies should rebalance programs in the light of changes in assumptions, scientific progress, or fiscal constraints. If you were writing the survey report, how would you address the inevitable changes in circumstances that can occur during the decade covered by the survey?

- How can we generate maximal support for the survey process and maintain community solidarity behind the recommended program when it is completed?

- Can you suggest some ideas on how astronomy and astrophysics can argue effectively for more funds when there are many other pressing scientific and other national needs?

- Do you have any further advice on how the Astro2010 committee can go about its business and improve communications?

- The survey structure, which includes a first-stage study period on science and on the state of the profession, followed by a second- stage activity prioritization process, is different from previous surveys. Do you have advice for the committee regarding how the process is carried out, e.g. comments on how much separation vs interfacing there should be between the two stages?