

Frontiers of Astronomy with the World's Largest Radio Telescope

**National Astronomy and Ionosphere Center
Arecibo Observatory**

September 12 & 13, 2007

Hall of the States Building
444 North Capitol St., NW, Room 333
Washington, DC

Questions that motivate the meeting:

- *What are the scientific priorities in fundamental astrophysics, physics, cosmology, and solar system studies for the next 10-15 years for which the Arecibo Observatory can play a unique and critical role?*
- *What instrumentation is needed in order to fulfill Arecibo's roles?*
- *What strategic planning can be done to engage broader community involvement in Arecibo science?*

Agenda

Wednesday, September 12

07:30 Continental breakfast, available for all outside the meeting room

08:00 Welcome, organization and purpose of the meeting *R. Brown*

08:10 Introductory Overview *B. M. Lewis*

08:30 PULSARS AND FUNDAMENTAL PHYSICS (*Chair J. Cordes*)

Intro: Timing relativistic millisecond binaries for GR, NS masses

1. Constraining Properties of Dense Matter with Precision
Radio Timing Measurements *B. Link*
2. The Gamma-ray/Radio Connection *A. Harding*
3. Pulsar Array Gravitational-wave Observatory *A. Lommen*
4. Gravitational Radiation Backgrounds *F. Jenet*

10:00 Coffee

10:30 TRANSIENTS AND SETI (*Chair J. Cordes*)

1. Rotating Radio Transients *M. McLaughlin*
2. Exoplanet Bursts, Lunar Neutrinos, & Exotica *J. Lazio*
3. SETI at Arecibo, and at Home *D. Werthimer*
4. Radio Synoptic Survey Telescope *S. Myers*

12:00 Topical open discussion of “motivating questions” (*Moderator J. Cordes*)

12:30 **Lunch**, available for all outside the meeting room

13:30 COSMOLOGY AND GALAXY EVOLUTON (*Chair J. Rosenberg*)

1. Current Survey Activity at AO *R. Giovanelli*
2. Importance of Large Scale Surveys—from SDSS to radio *A. Szalay*
3. Synergy of AO Science with Present & Future
Large-Scale Surveys *M. Haynes*
4. Redshifted Extragalactic Molecular Lines *J. Darling*

14:55 Topical open discussion of “motivating questions” (*Moderator J. Rosenberg*)

*Intro: Future Extragalactic HI surveys at AO:
Strawman proposal*

R. Giovanelli

15:30 **Coffee**

16:00 EXPLOITING ARECIBO’S BROAD CAPABILITIES (*Chair B. M. Lewis*)

1. Implications of the Terrestrial Micrometeor Flux:
Radar Meteor Observations at Arecibo Observatory *J. Mathews*
2. Space Weather *S. González*
3. Single Pulse Studies of Pulsars & Emission Mechanisms *J. Rankin*
4. Arecibo Synergy with GLAST *D. Thompson*
5. Spacecraft Tracking and Communications *L. Gurvitz*
6. Where Stokes Never Trod: Detecting Photon ORBITAL
Angular Momentum *D. Stinebring*

18:30 **Meeting Reception and Dinner, at B. Smith’s Restaurant (in Union Station)**

Thursday September 13

07:30 Continental breakfast, available for all outside the meeting room

08:00 GALACTIC STRUCTURE FORMATION & EVOLUTION (*Chair S. Gibson*)

1. Magnetic Fields and Turbulence: Large Scale ISM
in Galaxies *E. Zweibel*
2. ISM Processes: Unknowns and Key Observational Tests *S. Stanimirovic/J. Everett*
3. Complex and Biological Molecules in the ISM *H. Arce*
4. The Extreme Dimension: Time-Variability and The
Smallest ISM Scales *D. Stinebring*
5. Magnetic Fields and the Evolution of the ISM *C. Heiles*
6. Magnetic Field Puzzles from Our Own Backyard *R. Taylor*
7. Magnetic Fields in External Galaxies and the Deep
Polarization Sky *R. Taylor*

10:25 **Coffee Break**

- 10:45** Topical open discussion of “motivating questions” (*Moderator J. Weisberg*)
- 11:15** NEAR EARTH OBJECTS & THE ARECIBO PLANETARY RADAR (*Chair L. Carter*)
1. The Arecibo Radar System: Future Research Potential and Current Needs *D. B. Campbell*
 2. Investigating the Near-Earth Object Population *W. F. Bottke*
 3. Radar Investigation of Near-Earth Asteroids *S. J. Ostro*
 4. Summary of Issues Relating to the Orbits of Near-Earth Objects *D. K. Yeomans*
- 12:15** Topical open discussion of “motivating questions” (*Moderator L. Carter*)
- 12:45** **Lunch**, available for all outside the meeting room
- 13:45** INSTRUMENTATION DEVELOPMENT (*Chair G. Rajagopalan*)
1. Wideband Receivers *G. Cortés*
 2. Multi-beam and Focal Feed Arrays *G. Cortés*
 3. FPGA Technology *D. Werthimer*
 4. RFI Excision *S. Ellingson*
- 14:45** PRECISION ASTROMETRY & HIGH RESOLUTION CONTEXT (*Chair C. Lonsdale*)
1. Central images of Gravitational Lenses *S. Doeleman*
 2. Ultraluminous Infrared Galaxies *C. Lonsdale*
 3. Gamma-ray Burst Afterglows *Y. Pihlstrom*
- 15:30** Topical open discussion of “motivating questions” (*Moderators C. Lonsdale/G. Rajagopalan*)
- 15:45** **Coffee Break**
- 16:15** OPEN DISCUSSION: REQUIREMENTS, ACTION ITEMS (*Moderator R. Brown*)
1. New Instrumentation
 2. Data Management
 3. Joint Ventures and Partnerships with Other Communities and Instruments
 4. Synergies
 5. Priorities
- 17:15** FINALE (*Raconteur Y. Terzian*)
- 17:30** **Adjourn**