

# Building the Foundation for U.S. Astronomy at m/cm Wavelengths in 2010 and Beyond

---

## Community Workshop (\*)

### Workshop SOC/LOC

Robert Brown (NAIC)  
Chris Carilli (NRAO)  
Jim Cordes (US SKA Consortium)  
Dale Frail (NRAO)  
B. Murray Lewis (NAIC)  
K. Y. Lo (NRAO)  
Emmanuel Momjian (NAIC)  
Yervant Terzian (US SKA Consortium)

(Special thanks to Billie Rodriguez, Jill Tarbell and Joan Martin)

\* Support provided by NSF, NRAO, and NAIC

---

## Purpose of the Meeting—Why Are We Here?

1. **We recognize that:**

- Scientific research is a forward-looking enterprise; new research opportunities are made possible by new instruments;
- The path to secure funding for new instruments is long, and the process is extremely competitive;

2. **Hence, it is in our interest to plan carefully for the research facilities needed in the future. We need a plan. The plan must be based on scientific priorities. The plan will evolve with time.**

3. **The international SKA project is gaining momentum worldwide:**

- Near-term funding prospects for SKA technology demonstration projects in some countries are encouraging;
- SKA concept development in most critical technical areas is still in its formative stages;
- The US SKA consortium plays an active role in SKA development but its influence is diminishing as funding for the US TDP project remains stalled;

4. **Hence, it is our interest to develop a community consensus to guide SKA concept development in a manner that will enable it to satisfy our future research facilities plan. Such consensus will open funding doors.**

---

# Who are We?

1. Advocates for, and beneficiaries of, the continuing growth of research opportunities at m/cm wavelengths
2. U.S. scientists who make use of the products of research at m/cm wavelengths, in combination with theoretical analyses and the products of research at other wavelengths, to seek astrophysical understanding that we can educate students and enlighten the public
3. Representatives of NSF/AST charged with responsibly allocating funds for ground based astronomy in the US.

→ We are self-selected representatives of the US astronomy community.

---

## Goals of the Meeting—Five Desired Results

1. Statement of our vision for the key scientific objectives of US astronomy at m/cm wavelengths in the next decade and beyond.
2. Statement expressing our understanding of the multi-disciplinary context in which the *key scientific objectives of US astronomy at m/cm wavelengths* are established and a statement of the unique insight that observations at m/cm wavelengths bring in that context.
3. Concise assessment of the primary instrument requirements—parameters of the facilities required—that are necessary to address the *key scientific objectives of US astronomy at m/cm wavelengths* and the primary technological challenges they present.

---

## Goals of the Meeting—Five Desired Results

4. Statement of the parameters for which the widely-recognized, international, SKA project meets the primary instrument requirements. Assessment of whether alternative approaches to a monolithic SKA exist for meeting the primary instrument requirements and, if so, note the arguments for pursuing them. (That is, discuss—from a US perspective—whether the SKA is better structured as a telescope or as a program of internationally-accessible, next-generation, facilities). In all cases, discuss the technology development to be done in the US and the role of the TDP in organizing the development.
5. Assessment of the efficacy of the partnership between national centers and academic researchers in the future development of US astronomy at m/cm wavelengths.

# Structure of the Meeting

---

Session 1: Meeting Objectives

Session 2: Key Science with Contributed Ideas

Session 3: Key Science in Context → Breakout working groups

Session 4: [Evening] Free Format Brainstorming

Session 5: Working Group Reports

Session 6: Instruments and Options (by wavelength interval)

Session 7: Science in Frequency Space

Session 8: Meeting Conclusions

# US Astronomy at m/cm Wavelengths: A Record of Success

---

1. Currently operating U.S. national research facilities are unrivaled worldwide—(E)VLA, Arecibo, VLBA, GBT
2. All are operated with NSF/AST funding based on a competitive “open skies” scheduling policy→all are operated for the worldwide research community
3. US academic institutions actively engage in technology innovation for m/cm astronomy with support from NSF/AST ATI and MRI programs. These NSF programs leverage private/other agency support—e.g., ATA, MMICs, signal processors, computational imaging, electromagnetics—and feedback innovations to the national centers. Student education and training is a key element in all of these programs

The foundation of US astronomy at m/cm wavelengths in the past was the success of this partnership between national centers and academic researchers. Is it a sound basis for building the foundation of US astronomy in 2010 and beyond?