EECS/AEC
Antenna Anechoic Chamber

Chris G. Bartone, Ph.D., P.E., Professor
School of Electrical Engineering and Computer Science
Russ College of Engineering and Technology
Ohio University

Contact:
Chris G. Bartone, Ph.D., P.E.
349 Stocker Center
Athens, OH 45701
740-593-9573 (o)
740-591-1660 (m)
E-mail: bartone@ohio.edu

1 8 0 4

OHIO
UNIVERSITY

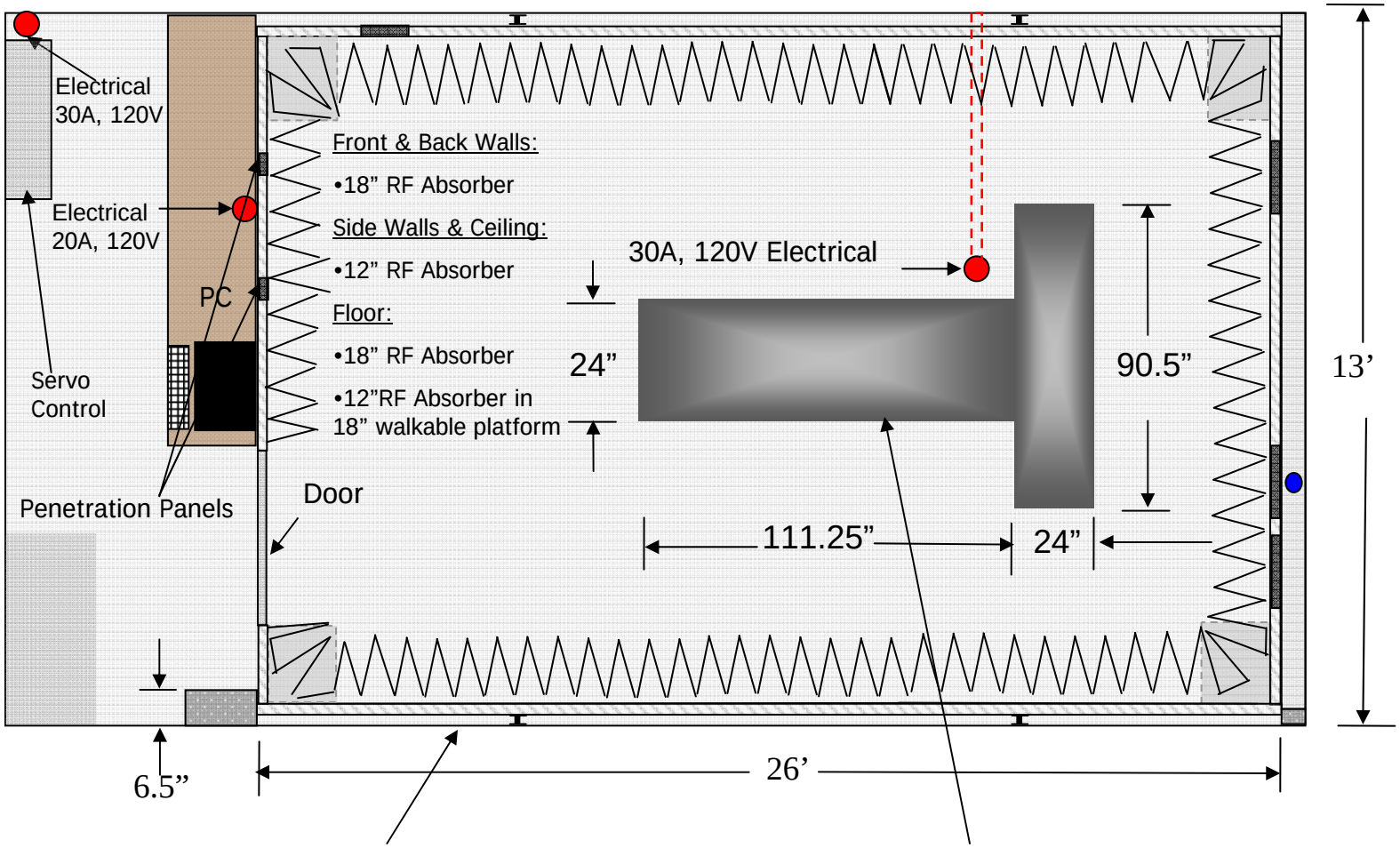
Acknowledgments

- Russ College Dean (former): Dr. Dennis Irwin
- AEC Director: Dr. Jim Rankin
- FAA LAAS Program Manager: Dr. Frank van Graas
- Graduate Student: Jeff Dickman, Ian Barton
- Undergraduate Students: Greg Coss and Mike Wills

Ohio University Antenna Anechoic Chamber Design Goals

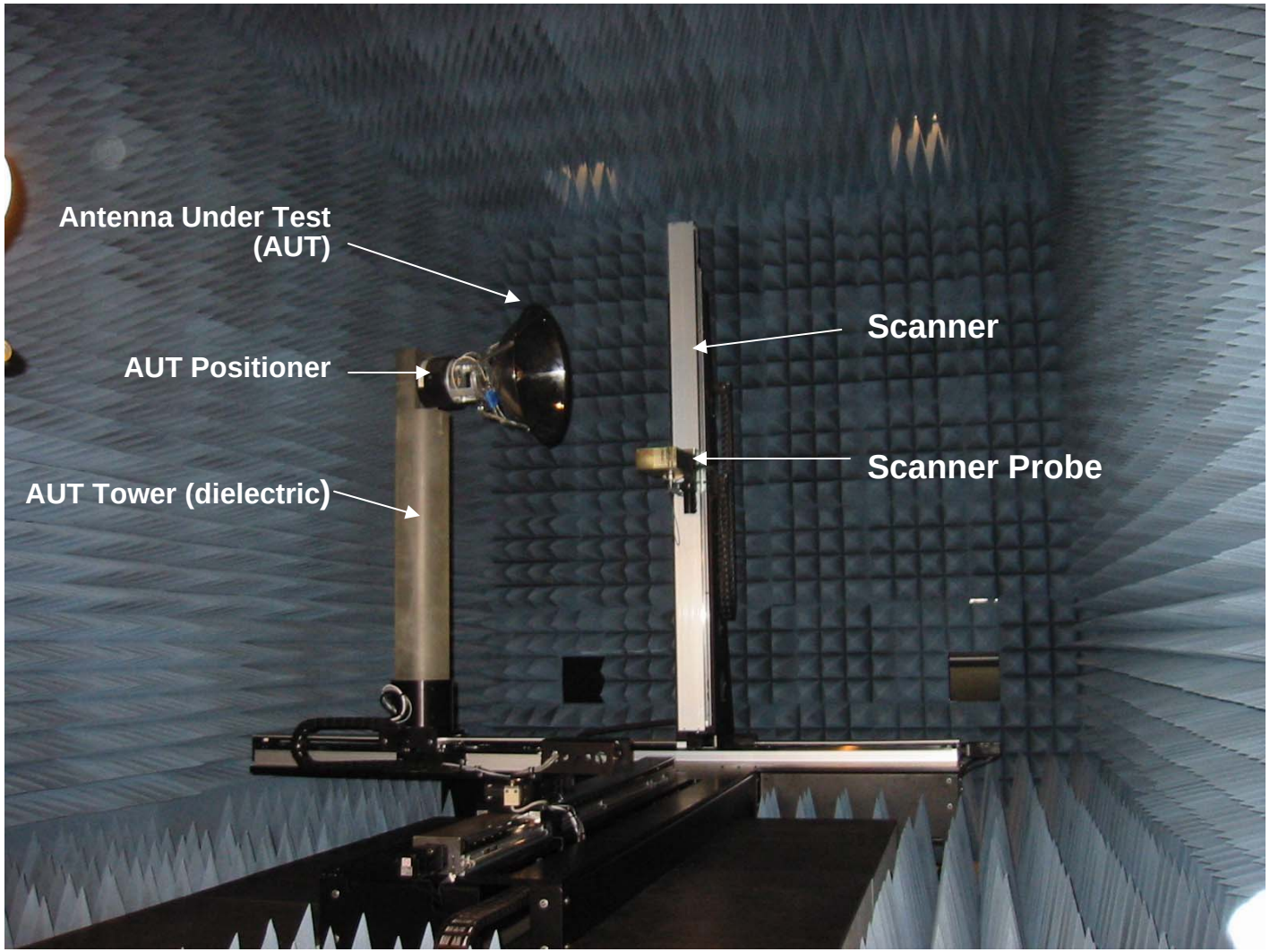
- Use for:
  - » Sponsored research
  - » Graduate Education
  - » Undergraduate Education
- Indoor Antenna Range for easy of use and efficiency
- Near-field Scanner for electrically large antennas
  - » System can still be used for far-field measurement for electrically small antennas
- Shielded Chamber for data integrity
  - » Useful for some Electromagnetic Interference Compatibility Testing
- Anechoic Chamber for data accuracy and validity
- Establish within existing University Facility

Antenna Anechoic Chamber Design



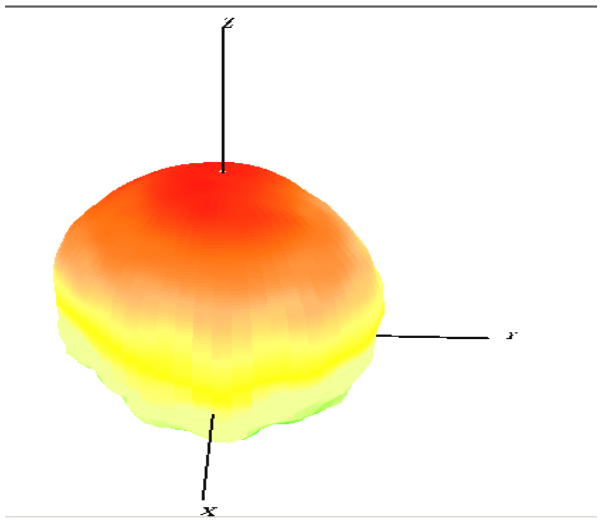
Shielded RF Chamber **Near-field Antenna Scanner**

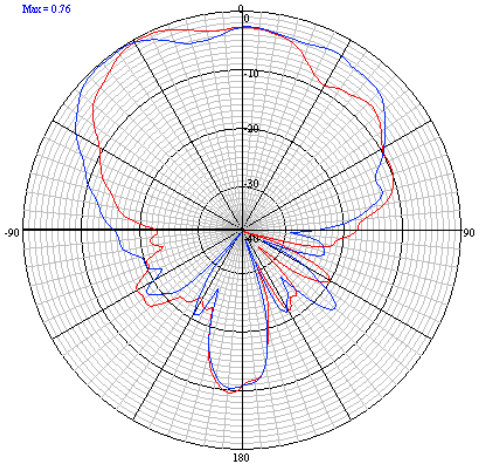
Ohio University Antenna Anechoic Chamber (First Test: EE495 Senior Design: Spring 2003)

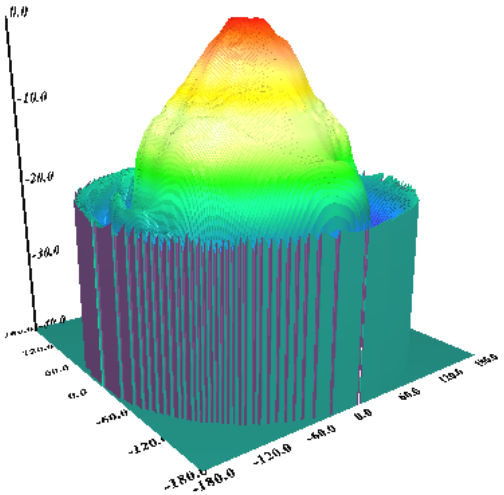


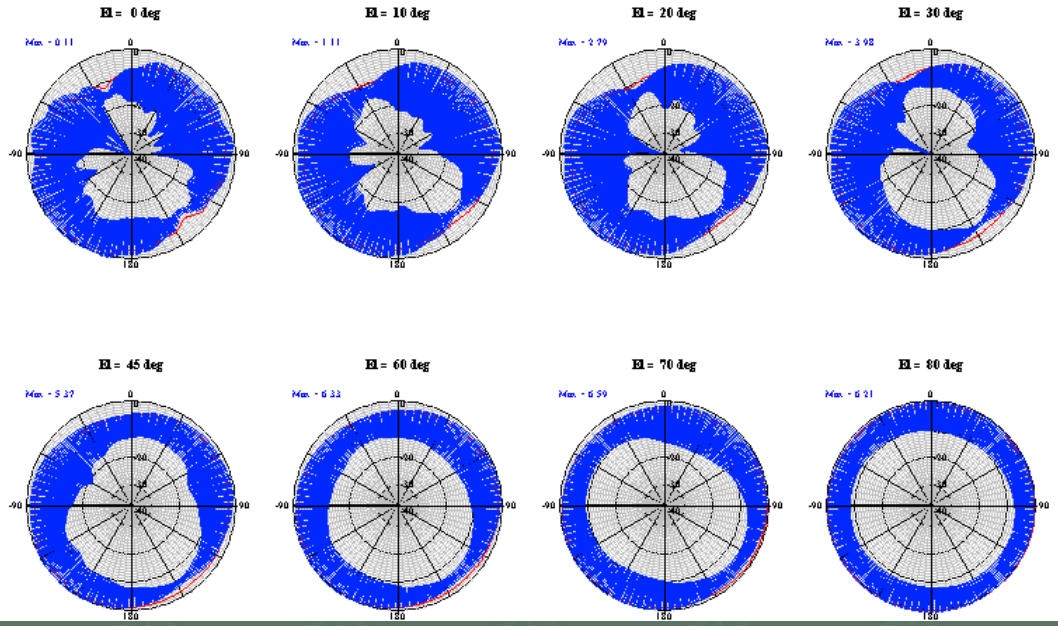
- 13'x13'x26'
- Shielded
- 6 ft x 6 ft x 6 ft Scanner
- 7-Axis
- Hybrid Scanner
  - » Planar
  - » Spherical
  - » Cylindrical
- AUT positioner removed for direct far-field
- Agilent 8753ES Based
- 10 kHz to 6 GHz

Typical Output Radiation Pattern Results

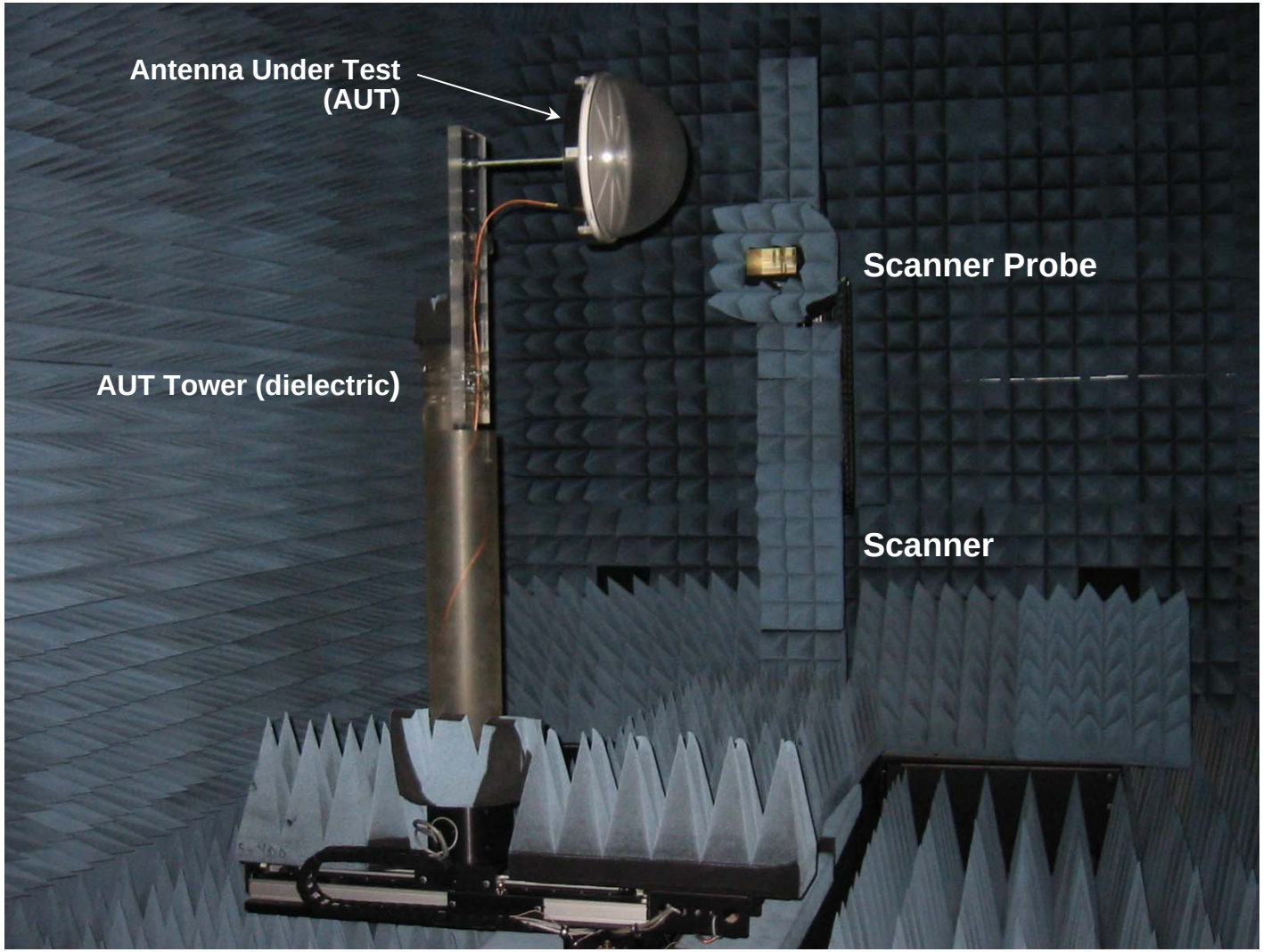






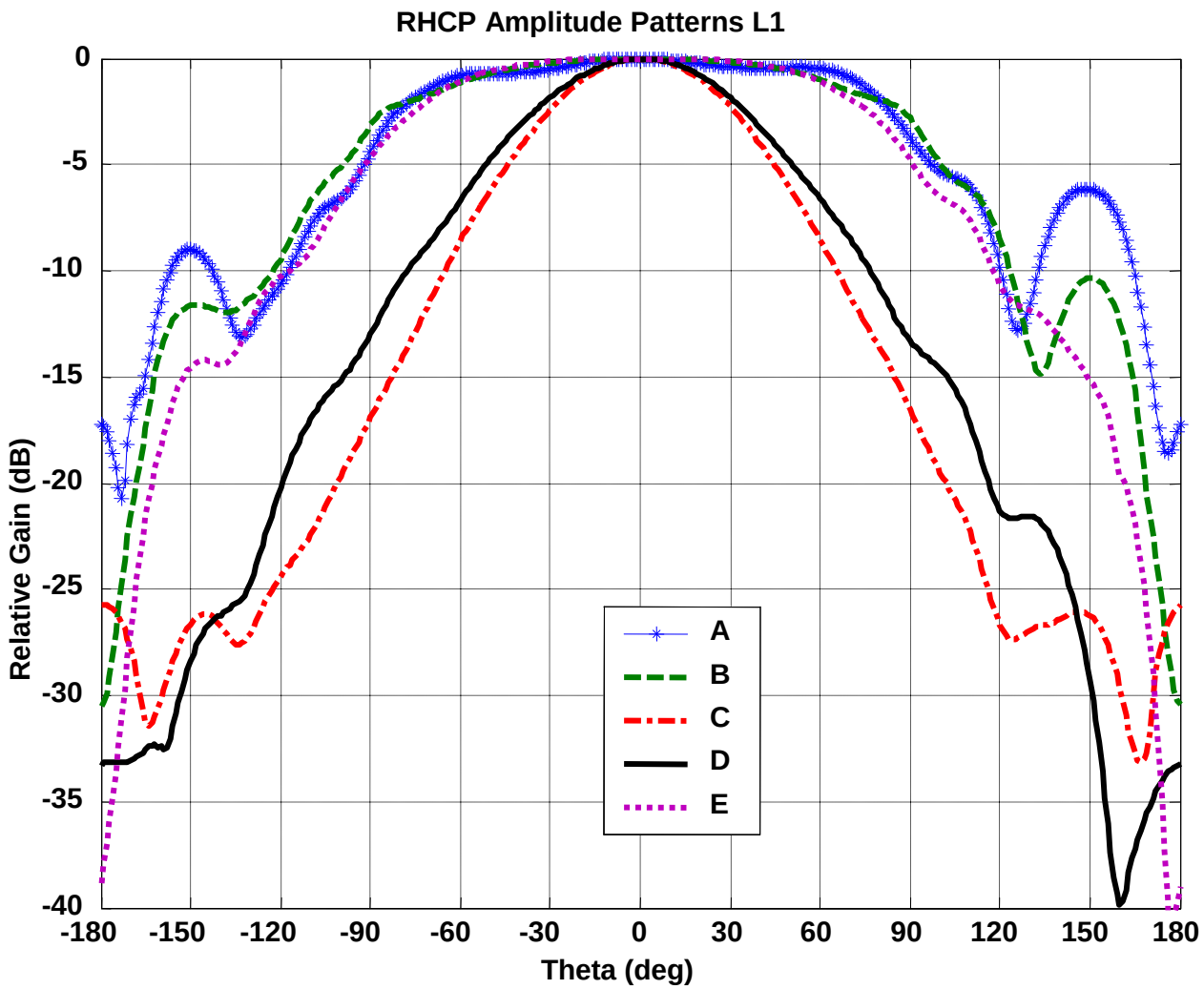


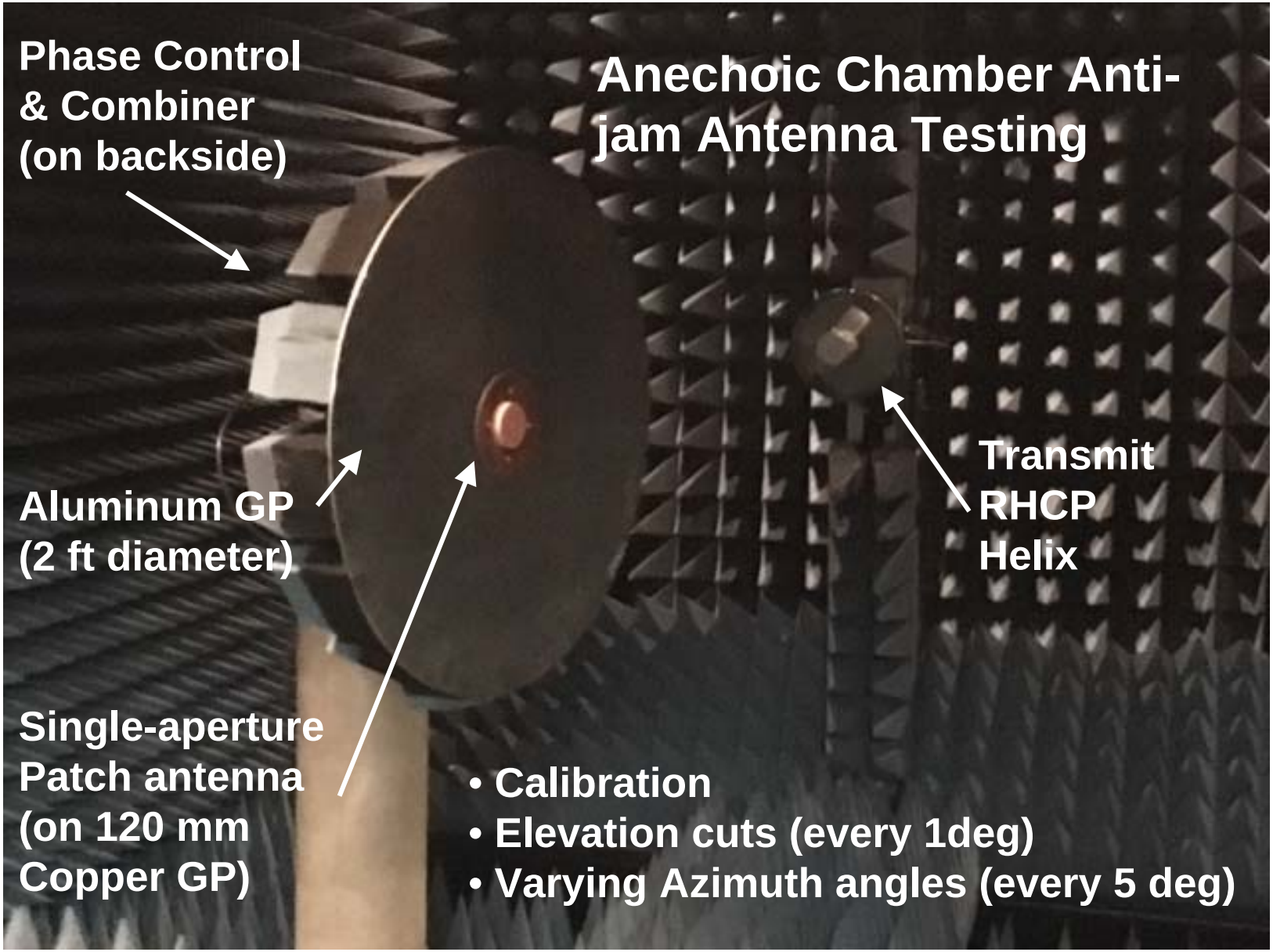
Antenna Anechoic Chamber-GPS Antenna



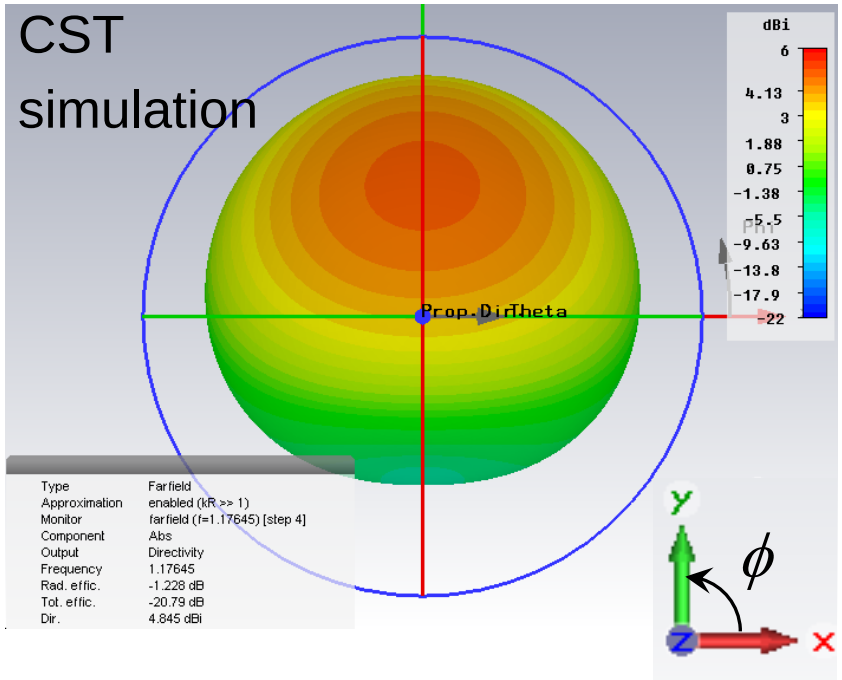
- **AUT positioner and walk-able surface removed**

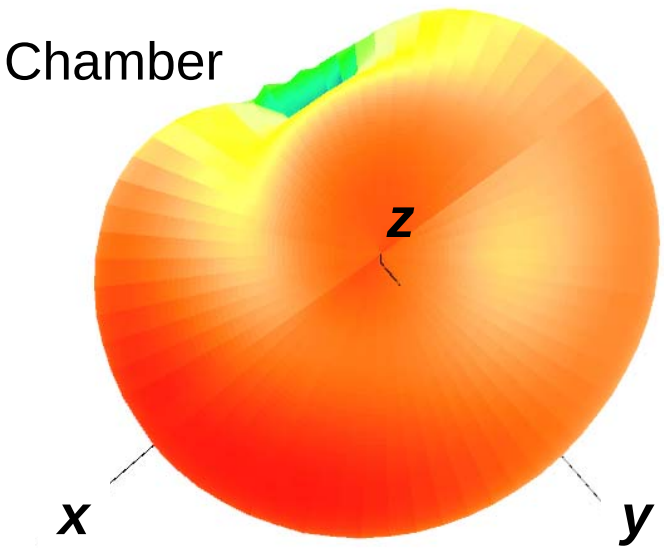
Typical GPS L1 Elevation Radiation Patterns

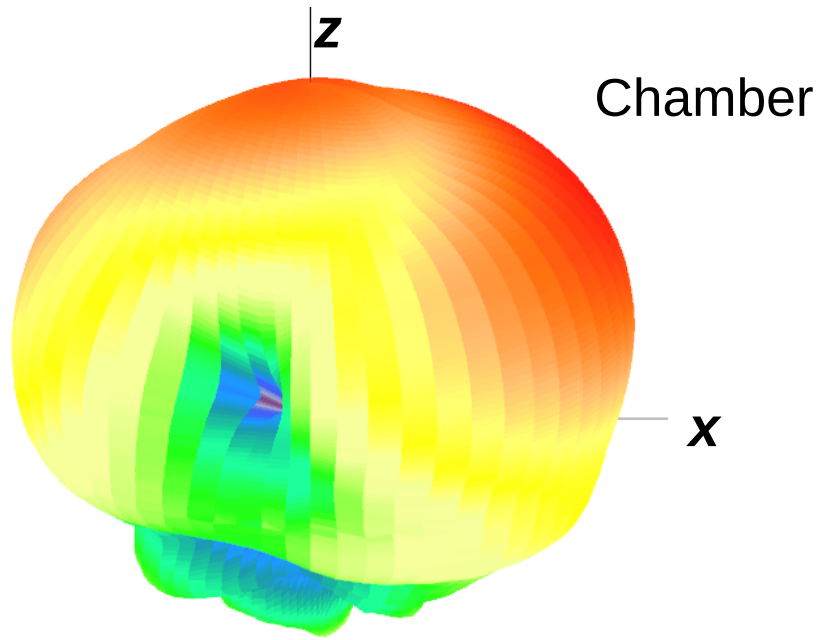



Phase Control
& Combiner
(on backside)
Anechoic Chamber Anti-jam Antenna Testing
Aluminum GP
(2 ft diameter)
Transmit
RHCP
Helix
Single-aperture
Patch antenna
(on 120 mm
Copper GP)
• Calibration
• Elevation cuts (every 1deg)
• Varying Azimuth angles (every 5 deg)

Simulation vs Measured Patterns







***y**: straight in from origin*

- **Measured results consistent with CST simulation results**

Summary

- **Initial Operational Capability as of 28 May 2003**
- **Indoor Antenna Anechoic Chamber Provides a new capability to launch and verify in-house antenna designs**
- **System can be used for both near-field and far-field measurements for electrical large and small antennas, respectively.**
- **Shielded Anechoic Chamber provides for added data accuracy and integrity.**
  - » **RF Shielding alone provide for over 100 dB of isolation, (e.g., 104 dB @ 3GHz)**
- **Will be used for:**
  - » **Sponsored research**
  - » **Graduate Education**
  - » **Undergraduate Education**