Radio Astronomy in the AMPATH Service Area

T. H. Troland

Physics & Astronomy Department

University of Kentucky

Lexington, KY USA

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Arecibo Observatory (NAIC)

- **Located near** *Arecibo, Puerto Rico*
- **Fixed spherical dish pointing straight up**
- **Movable transmitters & receivers suspended above dish**

The Arecibo Telescope

- **Dish** - 305 m diameter (world's largest)
- **Surface** – Aluminum panels, 300,000 kg, suspended above the ground on cables

The Arecibo Telescope

- **Triangular platform** – 800,000 kg, suspended 140 m above the dish
- **Azimuth arm** - Rotates to track celestial objects, 93 m long

Arecibo Observatory – Popular Interest

- **A popular site for movie makers (*Contact*, *Golden Eye*)**
- **An increasingly popular site for visitors (now 125,000 per year)**

Science at Arecibo

- **Radio Astronomy** – Passive reception of cosmic radio radiation
- **Radar Astronomy** – Radar studies of Solar System objects
- **Atmospheric Studies** – Radar studies of Earth's ionosphere

Connectivity at Arecibo - History

- **Internet 0** – **56 Kbs up until 1999**
- **Internet 1** – **T1 line (1.5 Mbs) from Puerto Rican Telephone Company**

Connectivity at Arecibo – Present & Future – Internet 2

- I2 connection established November, 2001

- OC-3 line (155 Mbs) to University of Puerto Rico
- DS-3 line (45 Mbs) to mainland (FIU – AMPATH)

Connectivity at Arecibo - Needs

- **Remote Observing – Observing programs often of long-duration, visiting scientists cannot always be on site for data taking.**

Connectivity at Arecibo - Needs

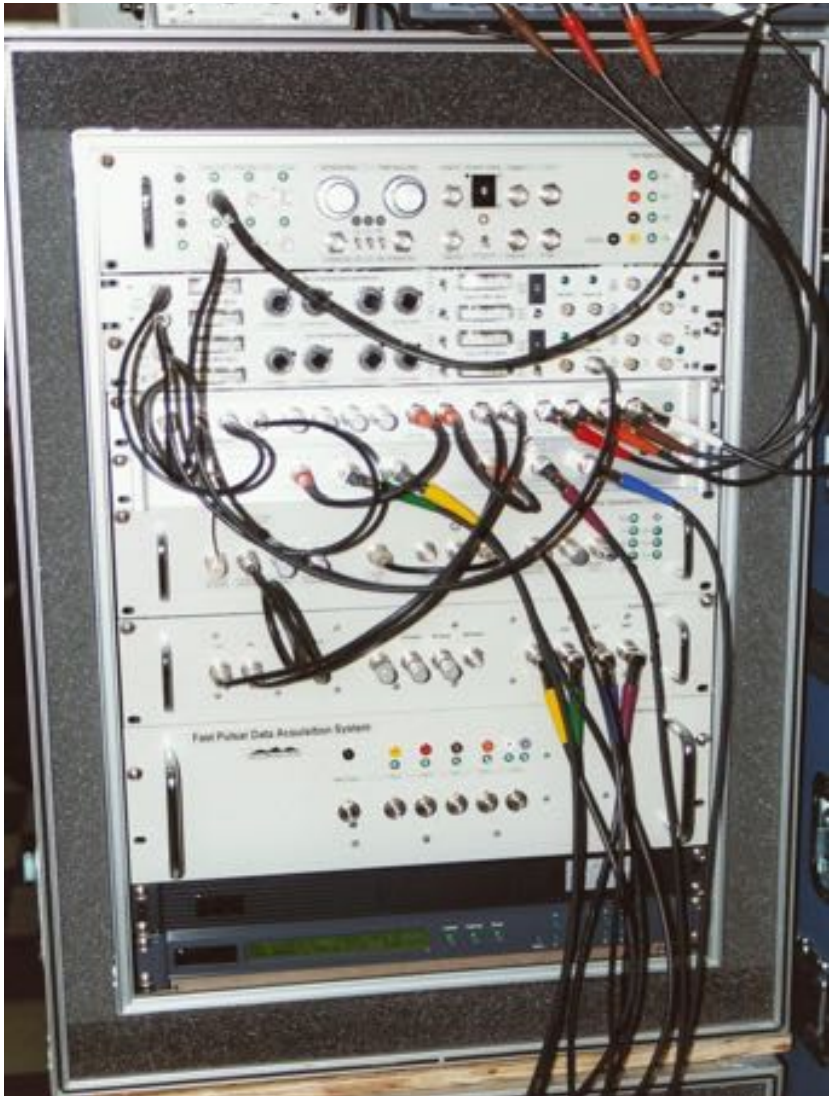
- **Remote data analysis** – **Visiting scientists often need to run Arecibo data analysis software remotely from their home institutions.**

- **Data export** – **Visiting scientists often need to export large data sets to their home institutions.**

Connectivity at Arecibo – Future Challenges

- **New (and planned) instrumentation** – **Will dramatically increase data taking rate.**

- **New data analysis packages** – **Will require better connectivity for remote operation.**

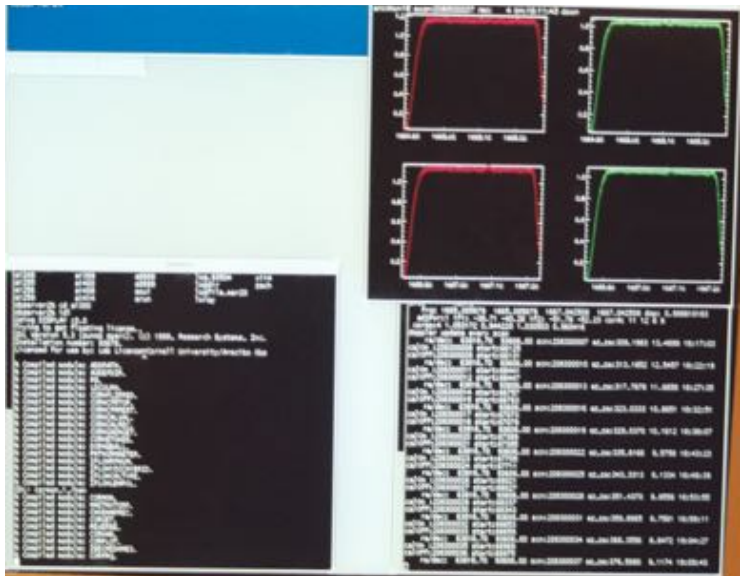


Connectivity at Arecibo – Future Challenges

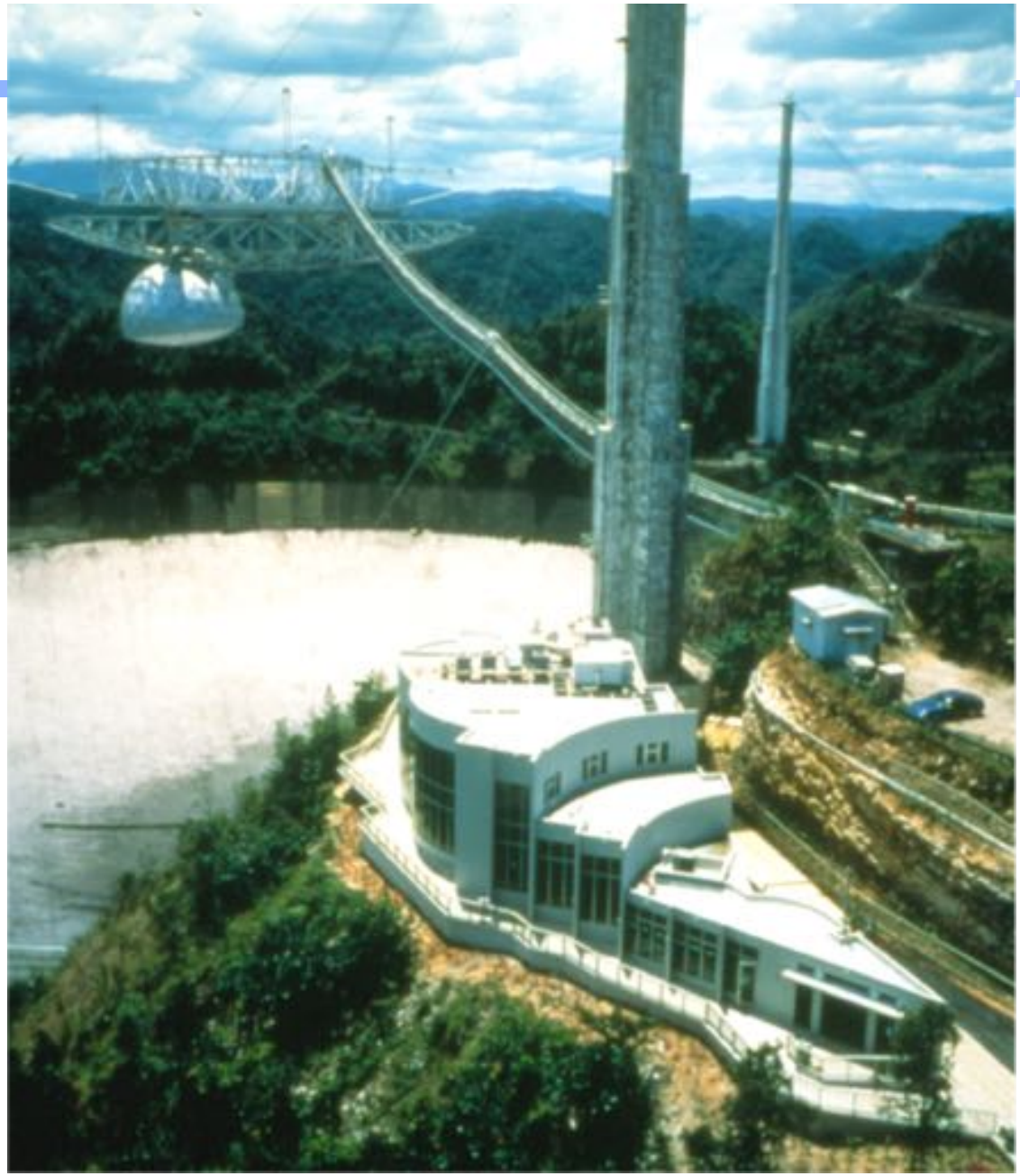
- **Virtual Control Room – Will require high-speed and very reliable connectivity to scientists' home institutions.**

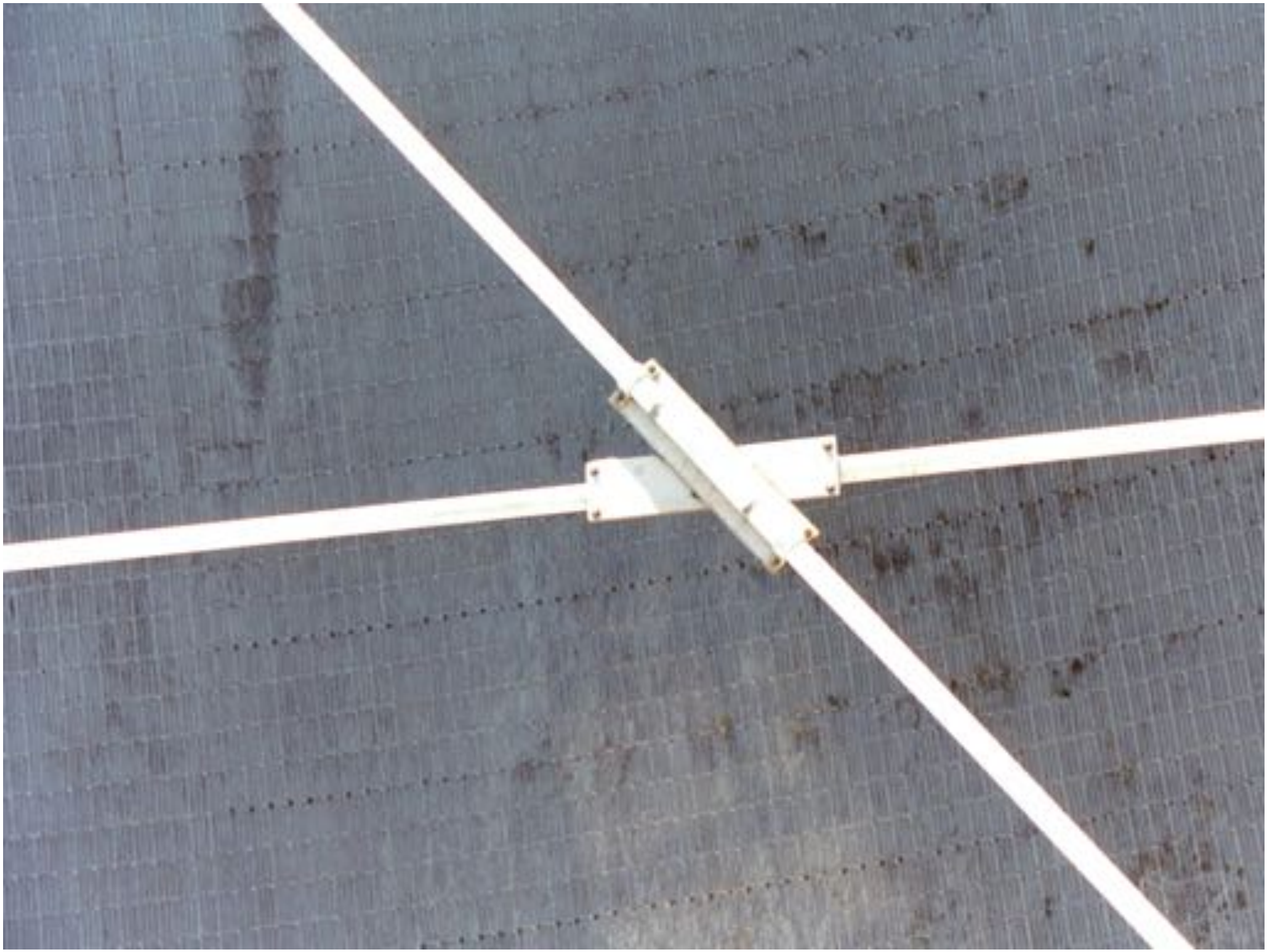
A Current Project at Arecibo (T. Troland *et al.*)

- **Radio astronomy – Study of radio radiation from interstellar clouds** (λ 18 & 21 cm)
- **Goal is to estimate** *magnetic field strengths* **in clouds &** *magnetic effects upon star-formation*
- **Collaborators – R. Crutcher (University of Illinois), C. Heiles (Berkeley)**



A Tour of Arecibo – Up to the Platform





A Tour of Arecibo – Under the Dish

The View from the Control Room

Radio Astronomy – The Future

- **Atacama Large Millimeter Array (ALMA)**
- **At least 64 antennas, 12 m diameter**
- **Llano de Chajnantor, Chile (5000m)**
- **Completion about 2010**
- ***Massive* connectivity issues**