

The Very Large Array: Interferometer Radio Telescope



Characteristics of the

VLA

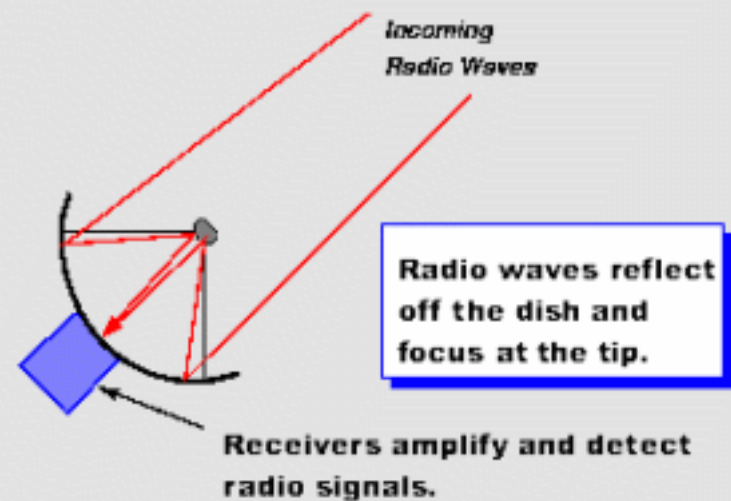
- ❖ Located in the Plains of San Augustin, NM
- ❖ Used by astronomers and also for satellite tracking, atmospheric and weather studies, and other sciences
- ❖ 27 parabolic radio antennas, each 25 meters in diameter and weighing 230 tons!
- ❖ Uses interferometry to combine data from all 27 dishes and create a very high resolution picture
- ❖ 4 different configurations, rearranged every 4 months
- ❖ Angular resolution as small as 0.4 arc seconds

[Aerial View of the VLA](#)

Interferometry

- ❖ Combines data from all receivers to form interference patterns
- ❖ Structure of source can be determined by differences in patterns as the earth rotates
- ❖ Fourier Transform: Process that uses interference patterns to create maps

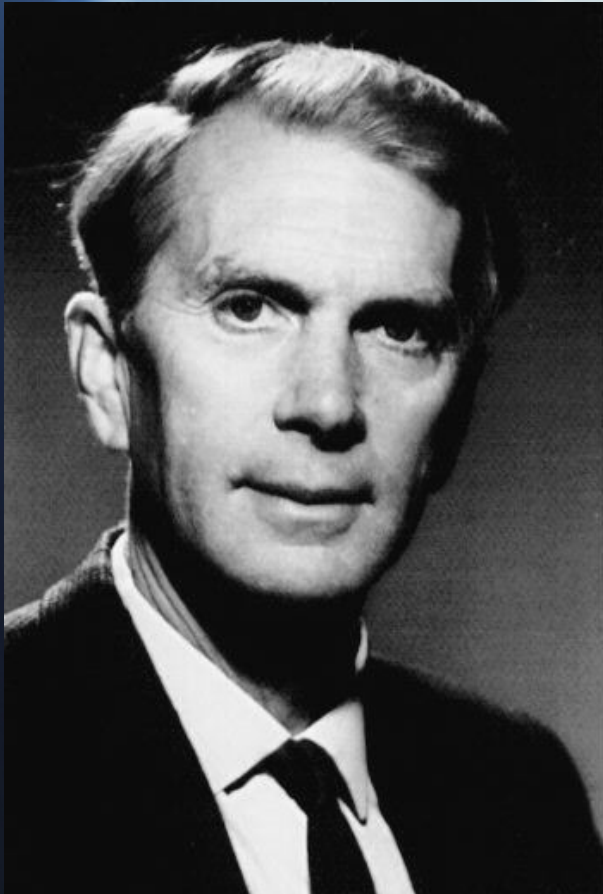
Radio Telescope



History

Radio Astronomy:

- ❖ Nicola Tesla in Colorado Springs (1900)
- ❖ Karl Guthe Jansky with Bell Laboratories (1930's)



Interferometry:

- ❖ Bolton and Gordon Stanley at Caltech-
work with Sea
Interferometers
- ❖ Martin Ryle's group in Cambridge
(1946)

History

The Very Large Array:

- ❖ 1964- National Academy of Sciences Panel formed
- ❖ 1967- First proposal to build the VLA
- ❖ 1972- Project approved by congress
- ❖ 1973- Construction begins
- ❖ 1975- First antenna placed
- ❖ 1980- Formal dedication of the VLA

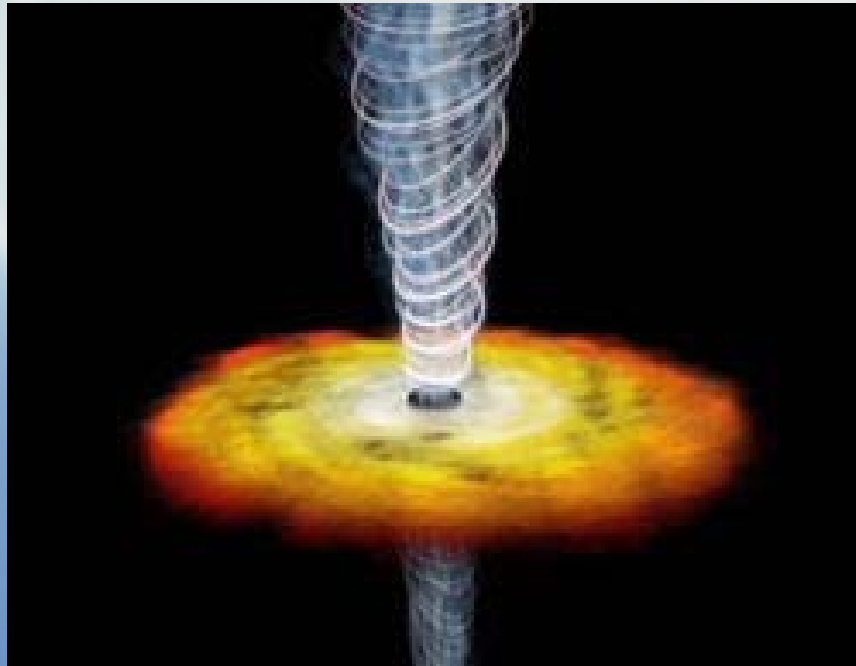
Total Cost: \$78,578,000,
roughly \$1/taxpayer in 1972



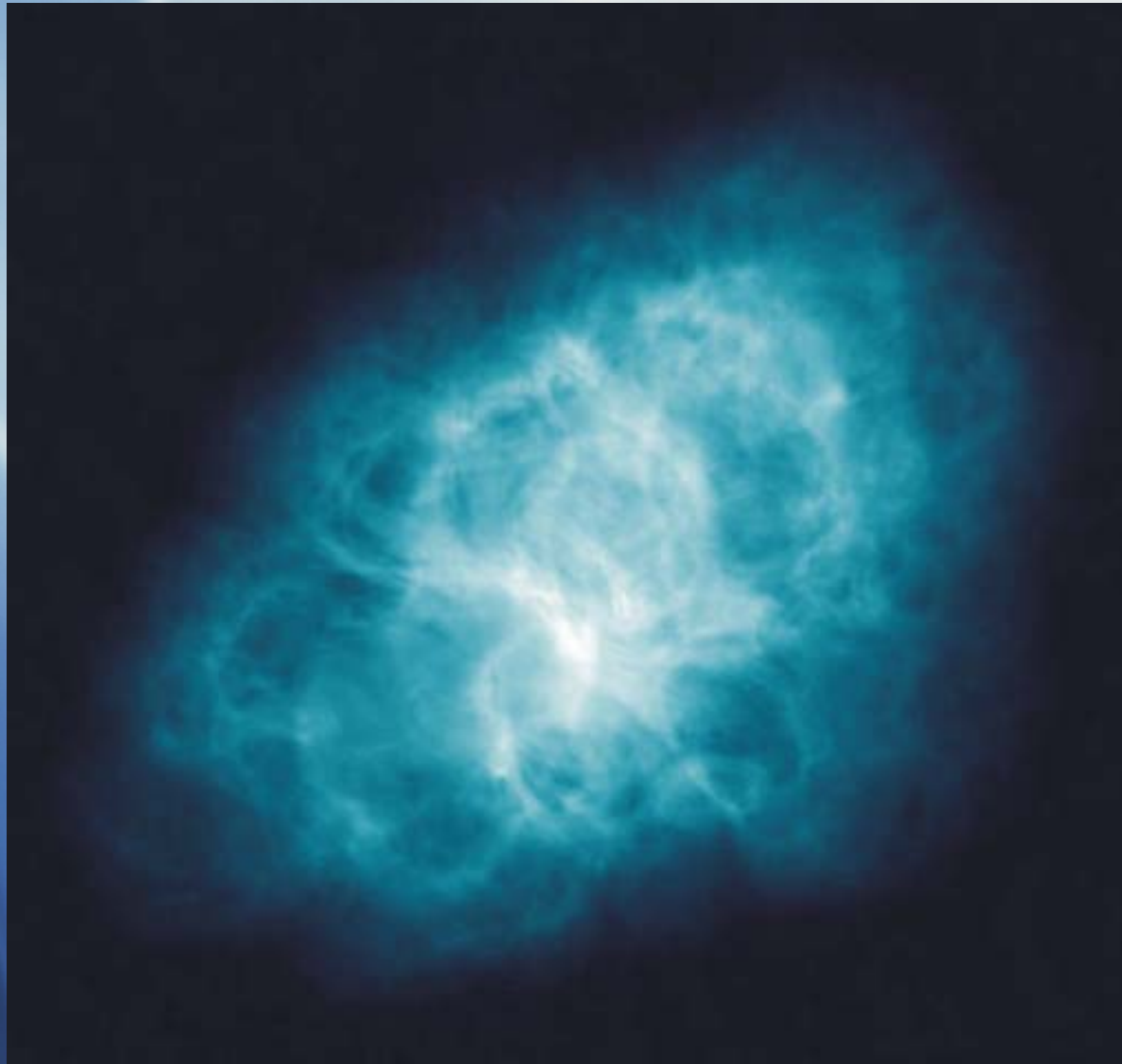
Sources of Radio

Waves

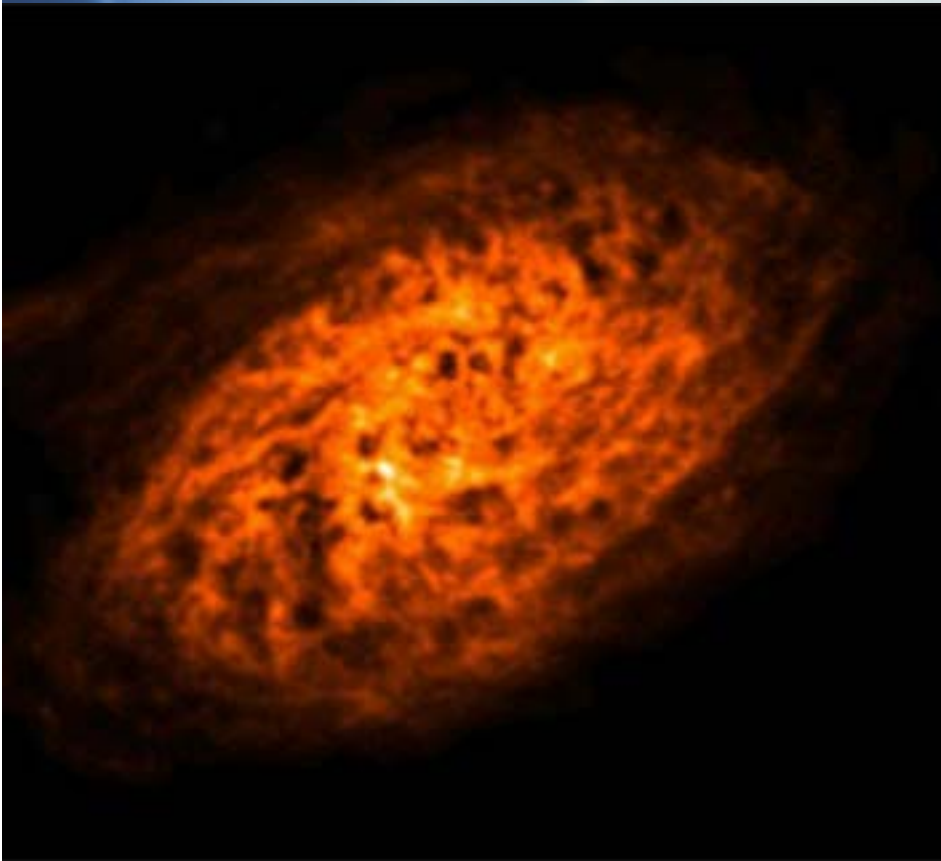
- ❖ Cosmic Microwave Background
- ❖ Milky Way galaxy
- ❖ Sun
- ❖ Quasars (“quasi-stellar radio source”)
- ❖ Pulsars



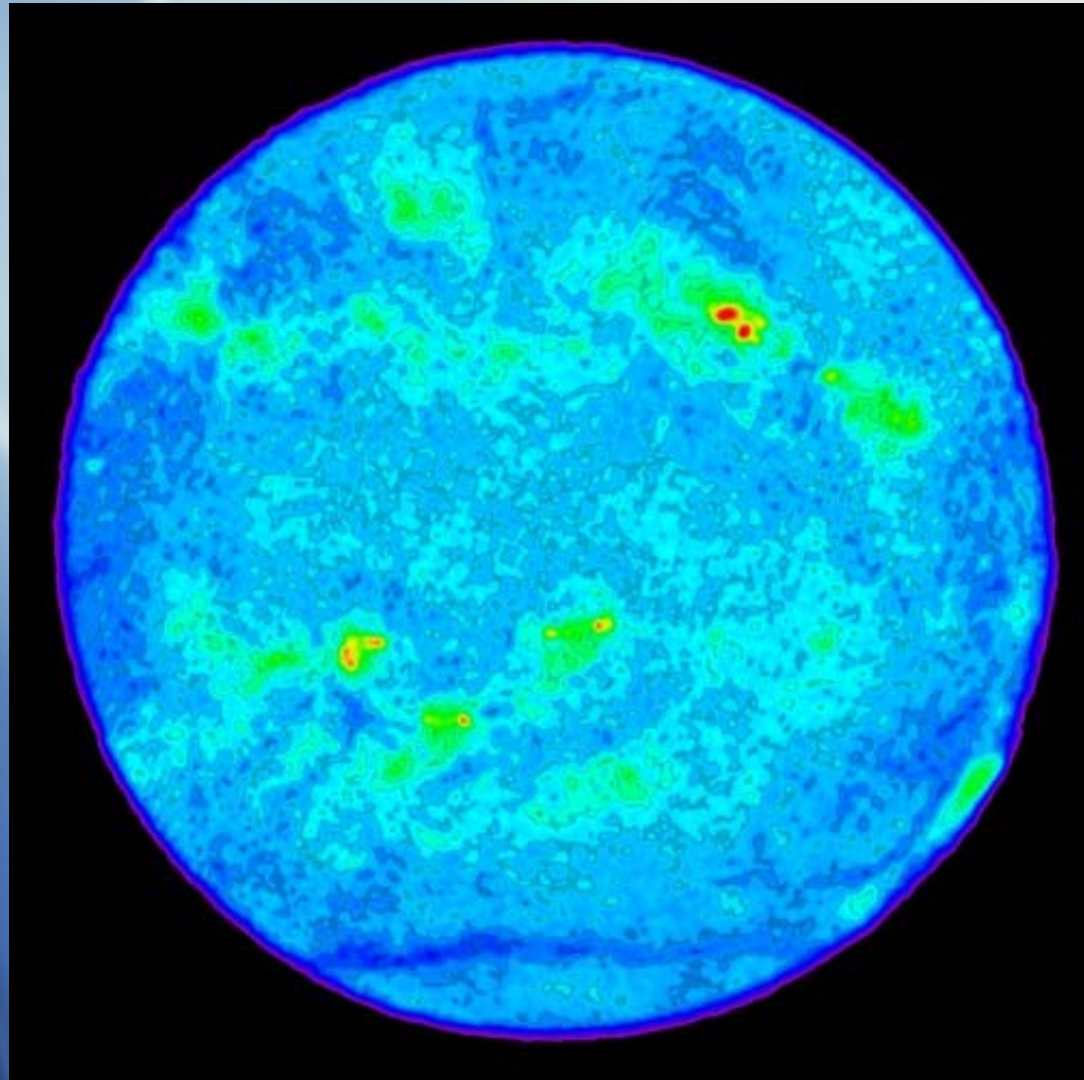
The Crab Nebula:



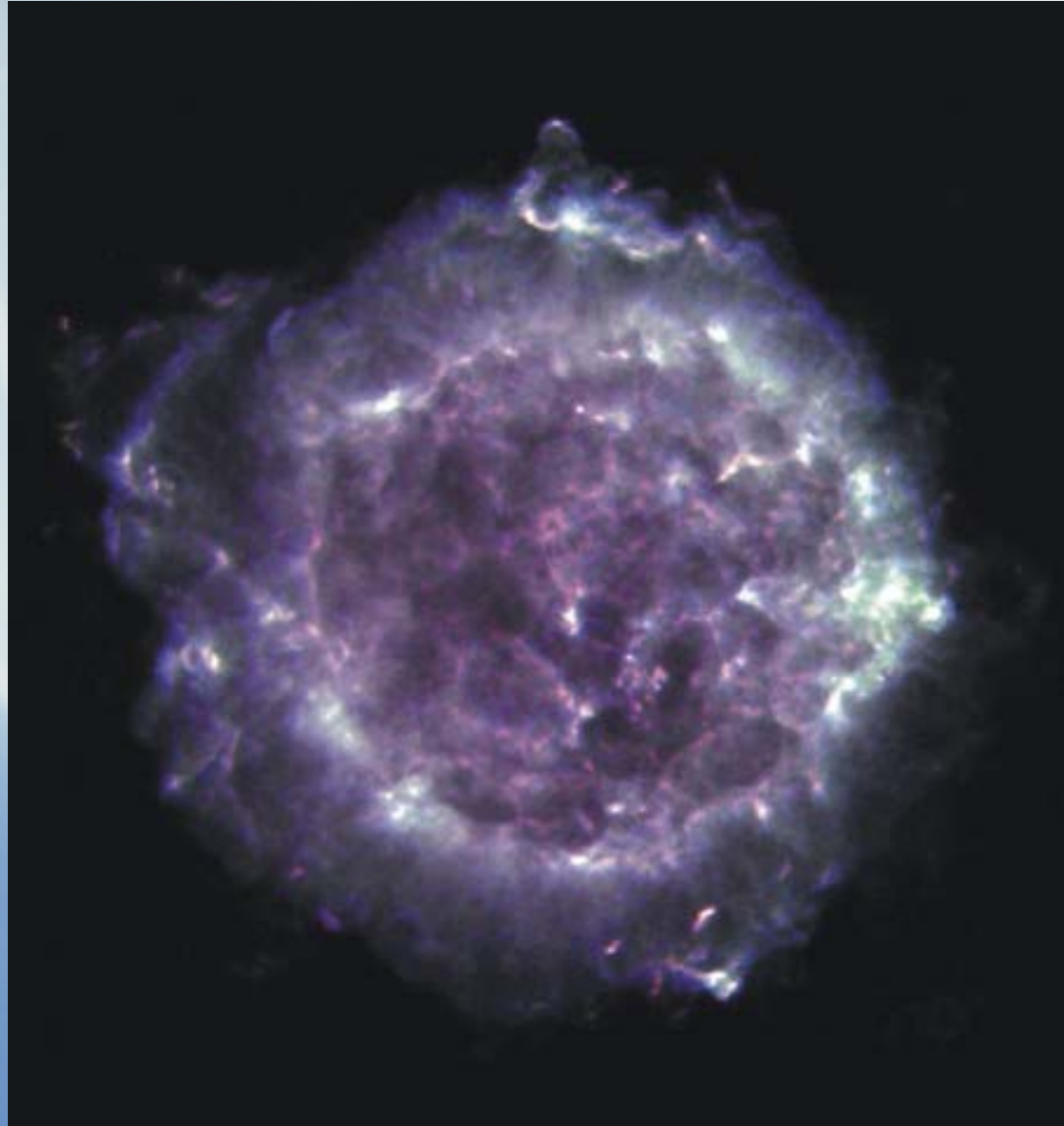
Spiral Galaxy:



The Sun:



Cassiopeia A:



The Expanded VLA (EVLA):

- ❖ Sensitivity
- ❖ Angular Resolution
- ❖ Imaging capabilities
- ❖ Operations
- ❖ Frequency Accessibility

