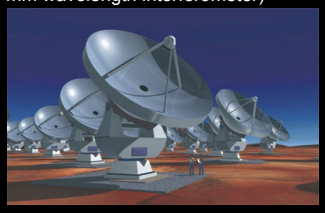
Expanded Very Large Array (VLA)
(cm-wavelength interferometer)

Star formation, Magnetic fields, High energy astrophysics

Atacama Large Millimeter Array (ALMA)
(mm/sub-mm wavelength interferometer)



Galaxy formation and evolution, Star and Planet Formation, Solar system

NRAO and the EVLA

Green Bank Telescope (GBT)
(filled aperture)

Interstellar medium, Astrochemical basis of life, Extreme physics

Very Long Baseline Array (VLBA)
(trans-continental array)

Active galactic nuclei (AGN), Black hole and jet physics, Precision astrometry

Two Key Questions

- What should NRAO facilities be doing <u>now</u> in collaboration with NASA's Great Observatories?
- What should NASA's Great Observatories be doing now to support science with NRAO's <u>future</u> facilities (EVLA and ALMA)?

The Era of the Great Observatories

- May 17th, NRAO "Legacy Projects Workshop"
  - 75 participants. Discussed science *and* policy
  - http://www.aoc.nrao.edu/events/legacy/
- NRAO must increase fraction of time for Large Proposals on all its facilities (Next call: August 2006)
  - Large Projects defined to be ≥ 200 hr of observing (i.e. 720 ksec, or ~133 HST orbits)
  - Previously allocated 10%-20% to Large Proposals
    - VLA and VLBA observe 6000 and 4500 hr/yr, respectively
  - New: limit to 25-50% depending on proposal pressure
    - No more than 50% of observing time at one Local Sidereal Time in one VLA configuration
    - Big change. Social engineering to remove perceived bias.

Past Large Proposals

AS801	VLA COSMOS	VLA A,C	2004-2005	264 hr	E.Schinnerer
AK563	Virgo: A Laboratory for Studying Galaxy Evolution	VLA C	2004-2005	240 hr	J. Kenney
BL123	MOJAVE: Monitoring of Jets in Active galaxies with VLBA Experiments	VLBA	2004-2005	14 x24 hr	M. Lister
AW605	THINGS: The HI Nearby Galaxy Survey	VLA B,C,D	2003-2005	293 hr	F. Walter
AH810	Coordinated Radio and Infrared Survey for High-Mass Star Formation	VLA B	2005	40 hr pilot	M. Hoare
BL111	MOJAVE: Monitoring of Jets in Active galaxies with VLBA Experiments	VLBA	2002-2004	17 x 24 hr	M. Lister
AK509	Cosmic Explosions	VLA	2000-2003	30 hr/month	S. Kulkarni
BC120	Pulsar Astrometry with the VLBA	VLBA	2002-2004	300 hr	S. Chatterjee
AS687	A Deep Radio Survey of the SIRTF First-look Survey	VLA B	2001-2002	240 hr	T. Soifer
AB628, AB879, AB950	FIRST Survey	VLA B	1993-2002	3209 hr	R. Becker
AG592	HI Survey of Clusters in the Local Universe	VLA C	2001-2002	360 hr	J. van Gorkom
AP397	A 4-meter All-sky Survey	VLA BnA,B	2001	70 hr pilot	R. Perley
AT245	A Global, High Resolution HI Survey of the Milky Way	VLA D	2000	260 hr	R. Taylor
C308	NRAO VLA Sky Survey	VLA D,DnC	1993-1996	2939 hr	J. Condon

Current Large Proposals

(see www.vla.nrao.edu/astro/)

AH884	The Coordinated Radio and Infraed Survey for High-Mass Star Formation (The CORNISH Survey)	VLA B, BnA	2006-2007	360 hr	M. Hoare
BL137	MOJAVE II: Monitoring of Jets in Active galaxies with VLBA Experiments II. Entering the GLAST Era	VLBA	2006-2007	384 hr	M. Lister
BT085	The VLBA Imaging and Polarimetry Survey (VIPS)	VLBA	2006	195 hr	G. Taylor
BR100	The Spiral Structure and Kinematics of the Milky Way	VLBA	2005-2007	270 hr	M. Reid
AK583	Cosmic Explosions	VLA	2005-2006	20 hr/month	S. Kulkarni
AP452	VLA Low-frequency Sky Survey	VLA BnA, B	2003-2006	690 hr	R. Perley

VLA "Blank Field" Proposals

- Best telescope for deep radio integrations of extragalactic fields
- Crucial for localizing the IR/submillimeter galaxy population

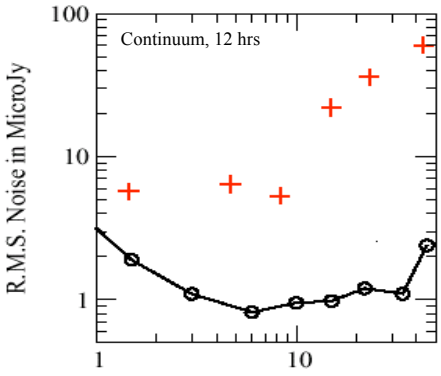
AM857	A Deep & Unbiased Probe of Star Formation in the GOODS Northern Field	VLA A	2006	77 hr	G. Morrison
AO201	The SWIRE Deep Field at 90cm: A Steep Spectrum MicroJy Radio Population?	VLA A,C	2006	66 hr	F. Owen
AS859	Follow-up of the COSMOS 1.4 GHz Imaging Survey: Identification of Dusty Massive Starforming Systems	VLA A	2006	60 hr	E. Schinnerer
AY164	An In-depth Investigation of the Nature of the Faint 24 Micron Spitzer Sources and 1100 Micron AzTEC Sources in the FLS Verification Strip	VLA A,B	2006	96 hr	M. Yun

Joint NRAO/GO Projects Now

Science Question	Project	Telescope(s)
Galaxy Evolution	Red-shifted molecular lines	GBT
Galaxy Evolution	More continuum surveys	VLA
Galaxy/BH connection	Imaging jets at z>2	VLA, VLBA
Early Universe	High z GRBs	VLA
Galactic Transients	SGRs, SNe, AXPs, BDs, XRBs	VLA, GBT ,VLBA
Our Galaxy	Atomic & molecular gas, Ionized gas, B-fields	GBT & VLA

The EVLA Project

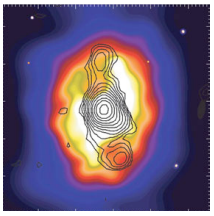
- 10x increase in continuum sensitivity
- Continuous frequency coverage from 1 to 50 GHz
- Designed for easy access by all astronomers
- NSF/AST ($57M) + North American partners
  - Finished in 2012
  - First science 2009-2010



EVLA Design Driven By Four Themes

Magnetic Universe

Measure the strength and topology of the cosmic magnetic field.



Obscured Universe

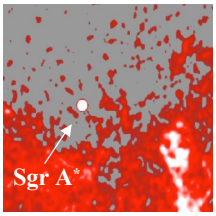
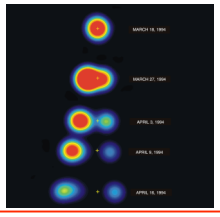


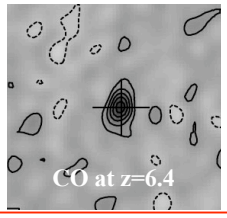
Image young stars and massive black holes in dust enshrouded environments.

Transient Universe

Follow the rapid evolution of energetic phenomena.



Evolving Universe



Study the formation and evolution of stars, galaxies and AGN.

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What should the GO's be doing now?

Science Question	Project	Telescope(s)
Our Galaxy	Complete census of nearby SF regions	Chandra, Spitzer
Our Galaxy	More galactic surveys	Spitzer
Globular clusters	Characterize compact object population	All
Galactic center	Stellar census and time domain	Spitzer, Chandra
Nearby galaxies	ISM, stellar and compact objects (ULXS and SNe)	All
Galaxy/BH connection	Compton thick AGN	Chandra
Extragalactic jets	Survey of flux-limited sample (3C) of radio jets	Chandra
Galaxy Clusters	Imaging all large clusters	Chandra

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