Top 5 NEW Observing Opportunities before 2012 (especially for UVa students)

a Katz and Gugliucci Production

Criteria

- Cover most wavebands
- Accessible to UVa grad students
- Filling a gap in scientific knowledge
- Available/online by 2012

GLAST: Gamma Ray Large Area Space Telescope

- Launch October 2007
- Science Goals: AGNs, pulsars, SNRs, GRBs, resolve gamma-ray background
- Large Area Telescope images 2.5 ster (30 MeV – 300 GeV)
- Burst Monitor (5 keV – 25 MeV)
- Guest investigator program

Large Binocular Telescope

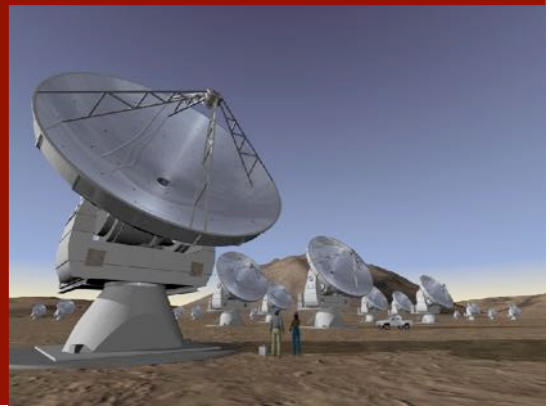
- Two 8.4 m mirrors on a common base
  - light-gathering power of single 11.8 m telescope
  - resolving power of a 22.8 m telescope
- Imaging and spectroscopy: 0.4 - 400 microns
- UVA has access to Mount Graham facilities
- Construction almost complete?
- Science Goals:
  - Star and planet formation
  - Direct detection of planets
  - Cosmology

Planck

- Launch February 2008
- Science Goals: CMB anisotropies to determine cosmological parameters to better than 1%; polarisation
- 10 times sensitivity and 3 times resolution of WMAP
- Data available beginning 9 months after operations

Atacama Large Millimeter Array

- up to 64 antennas (12 meters each)
- at least 30 ready by 2012
- High and Dry: Elevation 16,400 feet – Llano de Chajnantor, Atacama desert, Chile
- Largest and most sensitive instrument in the world at millimeter and submillimeter wavelengths
- Imaging in all atmospheric windows between 10 mm and 350 microns
- Spatial resolution: 10 milliarcseconds (10 x better than the VLA and HST)
- Spectral resolution: under 0.05 km/s



ALMA Science

- **Three key science goals:**
  - detect spectral line emission from CO or CII in a normal galaxy like the Milky Way at a redshift of z = 3, in less than 24 hours of observation
  - image the gas kinematics in protostars and in protoplanetary disks around young Sun-like stars at a distance of 150 pc
  - provide precise images at an angular resolution of 0.1 arcsec

Additional Capabilities:

The Early Universe
Gravitational Lenses
Quasar Absorption Lines
ISM
Protostars

Stellar Evolution
SNR
The Solar System
Asteroids, Comets
Extrasolar Planets

EVLA: Expanded Very Large Array

- Ongoing; finish 2010
- Science Goals: Radio galaxies, SNRs, planets, pulsars, SFRs, ISM, galaxy clusters, GRBs, ...
- Sensitivity, bandwidth, frequency resolution, digitization, new receivers
- Time awarded by TAC

Top 5 (by wavelength)

- GLAST
- LBT
- Planck
- ALMA
- EVLA