



# Observing Application

Date : Jan, 05 2010  
 Proposal ID : VLA/09C-196  
 Legacy ID : AH1010  
 PI : Craig Heinke  
 Type : Rapid Response - Target of Opportunity  
 Category : Stellar, Galactic  
 Total Time : 2.0

## Identifying the outbursting X-ray binary in NGC 6440, & measuring its radio flux

### Abstract:

Two X-ray binary transients have been identified in the globular cluster NGC 6440, with different X-ray outburst histories. Both have recently been identified as accreting millisecond pulsars. A major X-ray outburst is currently underway from NGC 6440, identified with the new Japanese X-ray all-sky monitor MAXI, at an inferred luminosity of  $3e37$  ergs/s. Identifying which transient is erupting (a known source, or another) is critical for understanding the mass transfer histories of these X-ray binaries, and for understanding the populations of neutron star binaries in globular clusters. A rapid response observation before the VLA upgrade is likely to detect the X-ray binary, based on prior observations of neutron star X-ray binaries. A measurement of the radio and X-ray flux (VLA/MAXI) will also constrain theories of jet formation in neutron star binaries.

### Authors:

| Name               | Institution                           | Email                | Status |
|--------------------|---------------------------------------|----------------------|--------|
| Craig Heinke       | University of Alberta                 | heinke@ualberta.ca   |        |
| Gregory Sivakoff   | Virginia, University of               | grs8g@virginia.edu   |        |
| James Miller-Jones | National Radio Astronomy Observatory  | jmiller@nrao.edu     |        |
| David Pooley       | Wisconsin at Madison, University of   | dave@astro.wisc.edu  |        |
| Jeroen Homan       | Massachusetts Institute of Technology | jeroen@space.mit.edu |        |
| Diego Altamirano   | Universiteit van Amsterdam            | d.altamirano@uva.nl  |        |

Principal Investigator: Craig Heinke  
 Contact: Craig Heinke  
 Telephone: 780 248-1432  
 Email: heinke@ualberta.ca

### Related proposals:

### Joint:

Not a Joint Proposal

### Observing type(s):

Continuum, Single Pointing(s), Triggered Transient

### VLA Resources

| Name | Conf. | Frontend & Backend | Setup |
|------|-------|--------------------|-------|
|------|-------|--------------------|-------|

| Name  | Conf. | Frontend & Backend   | Setup  |
|-------|-------|--|--|
| VLA-X | Any   | X Band 3.6 cm 8080 - 8750 MHz<br>VLA Correlator - Single Channel Continuum | Rest frequencies: 8435.1,8485.1 MHz<br>Bandwidth: 50 MHz |

### Sources:

| Name      | RA / RA Range            | Dec / Dec Range       | Epoch | Velocity / z    | Group   |
|-----------|--------------------------|-----------------------|-------|-----------------|---------|
| Transient | 17:48:52.7<br>00:00:00.0 | -20:21:34<br>00:00:00 | J2000 | Velocity : 0.00 | NGC6440 |

### Sessions:

| Name        | Session Time (hours) | Repeat | Separation | LST minimum | LST maximum | Elevation Minimum |
|-------------|----------------------|--------|------------|-------------|-------------|-------------------|
| Transient-X | 2.00                 | 1      | 0 day      | 14:00:00    | 22:00:00    | 0                 |

### Session Constraints:

| Name | Constraints | Comments |
|------|-------------|----------|
|      |             |          |

### Session Source/Resource Pairs:

| Session Name | Source    | Resource | Time     | Figure of Merit | Subarray |
|--------------|-----------|----------|----------|-----------------|----------|
| Transient-X  | Transient | VLA-X    | 2.0 hour | 0.015 mJy/bm    |          |

Present for observation: no

Staff support: None

Plan of Dissertation: no