



Observing Application

Date : Feb, 22 2012
 Proposal ID : VLA/12A-454
 Legacy ID : AM1172
 PI : Matthew Middleton
 Type : Director's Discretionary
 Time - Target of
 Opportunity
 Category : Energetic Transients and
 Pulsars
 Total Time : 2.0

Does the nearest ultraluminous X-ray source have a radio counterpart?

Abstract:

Ultraluminous X-ray sources (ULXs) are a well studied X-ray phenomenon that may be associated with either extreme accretion rates onto stellar mass black holes or more typical, sub-Eddington accretion onto a new class of intermediate mass black hole (IMBH). Distinguishing which solution is correct is difficult due mainly to their distance which has prevented successful multi-wavelength campaigns. In particular, the limiting radio luminosity of these sources has prevented observations which could readily distinguish the difference in outflows associated with either accretion regime. A new ULX has recently been discovered in M31 which provides an unprecedented opportunity to make the first radio detection of such an object and an unambiguous identification of the compact object driving the luminous emission. We request two 1 hour ToOs, initially to determine the presence and strength of a radio counterpart and then obtain a more comprehensive radio spectrum in the follow-up ToO in order to make direct comparisons to the jet emission from sub-Eddington and super-Eddington XRBs/AGN. The EVLA is the only instrument that can perform this analysis and provide this potentially ground-breaking result.

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Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Continuum, Single Pointing(s)

VLA Resources

Name	Conf.	Frontend & Backend	Setup
EVLA-C	C	C Band 6 cm 4000-8000 MHz WIDAR OSRO, Full Polarization	Rest frequencies: 5000.0,7500.0 MHz Subband Bandwidth: 128.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 2000.0 kHz Total Bandwidth: 2,048.00 MHz
EVLA-K	C	K Band 1.3 cm 18000 - 26500 MHz WIDAR OSRO, Full Polarization	Rest frequencies: 20800.0,25900.0 MHz Subband Bandwidth: 128.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 2000.0 kHz Total Bandwidth: 2,048.00 MHz

Sources:

Name	Position		Velocity		Group
XMMU J004243.6+412519	Coordinate System	Equatorial	Convention	Radio	M31 ULX
	Equinox	J2000			
	Right Ascension	00:42:43.6	Ref. Frame	LSRK	
		00:00:00.0			
Declination	+41:25:19.0	Velocity	0.00		
	00:00:00.0				

Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
Detection	1.00	1	0 day	19:00:00	06:00:00	15
Spectrum-C	0.30	1	0 day	19:30:00	05:30:00	20
Spectrum-K	0.70	1	0 day	19:30:00	05:30:00	20

Session Constraints:

Name	Constraints	Comments
Detection		To be taken as soon as possible, before the source fades
Spectrum-C	To be taken within a few days of the first observation, after the data from the Detection epoch have been analysed.	Observation only made if the ULX is detected in the first epoch. If <50 microJy/beam, we will observe only at C-band. If at >50 microJy/beam, we will split the time between C and K band to get better constraints on the source spectrum.
Spectrum-K	To be taken within a few days of the first observation, after the data from the Detection epoch have been analysed.	Observation only made if the ULX is detected in the first epoch. If <50 microJy/beam, we will observe only at C-band. If at >50 microJy/beam, we will split the time between C and K band to get better constraints on the source spectrum.