



# Observing Application

Date : Dec, 06 2007  
Proposal ID : VLA/08B-108  
Legacy ID : AS935  
PI : Alicia Soderberg  
Type : Rapid Response -  
Target of Opportunity  
Category : Extragalactic  
Total Time : 2.0

## Direct Detection of a SN Ia Progenitor and the Search for Shock-Accelerated CSM

### Abstract:

We have discovered the progenitor of the Type Ia supernova 2007on in archival Chandra images taken 4.5 years before the explosion. Type Ia supernovae are important astrophysical objects that are used to measure the accelerated expansion of the Universe, but their progenitors are unknown. The bright X-ray source we found favors a single-degenerate white dwarf progenitor system with a high accretion rate from a donor star. In this scenario, we expect a significant mass of circumstellar material local to the explosion site. Here we propose radio observations to search for synchrotron emission arising from the interaction of the SN ejecta with the circumstellar material. Detailed modeling of the radio emission will enable direct estimates of the circumstellar density and profile, and in turn, constraints on the history and efficiency of the progenitor system accretion rate. Since SN 2007on is estimated to be young (within one month of explosion), rapid response observations are critical to catch the cascading peak of the synchrotron spectrum. We request 2 hours of follow-up observations to be dynamically scheduled within the next few days.

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### Related proposals:

### Joint:

Not a Joint Proposal

### Observing type(s):

Continuum

### VLA Resources

Name	Conf.	Frontend & Backend	Setup
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Name	Conf.	Frontend & Backend	Setup
X-band	B	X Band 3.6 cm 8080 - 8750 VLA Correlator - Single	Rest frequencies: 8435.1,8485.1 MHz Bandwidth: 50 MHz
L-band	B	L Band 20 cm 1200 - 2000 VLA Correlator - Single	Rest frequencies: 1464.9,1385.1 MHz Bandwidth: 50 MHz

### Sources:

Name	RA / RA Range	Dec / Dec Range	Epoch	Velocity / z	Group
SN2007on	03:38:50.9 00:00:00.1	-35:34:30 00:00:01	J2000	Redshift : 0.006494	SN

### Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
SN L-band	1.00	1	0 day	02:00:00	04:00:00	0
SN X-band	1.00	1	0 day	02:00:00	04:00:00	0

### Session Constraints:

Name	Constraints	Comments
SN L-band	We request dynamic scheduling within next few days, if possible during Dec 6 dynamic slot.	
SN X-band	We request dynamic scheduling within next few days, if possible during Dec 6 dynamic slot.	

### Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit
SN L-band	SN2007on	L-band	1.0 hour	0.020 mJy/bm
SN X-band	SN2007on	X-band	1.0 hour	0.010 mJy/bm

Present for observation: no      Staff support: None      Plan of Dissertation: no