

SN1006 Science with POSSUM

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> Jennifer West Shannon Vanderwoude POSSUM Team



Dunlap Institute for
Astronomy & Astrophysics
UNIVERSITY OF TORONTO

ASKAP SN1006 Test Field Observed February 2019 288 MHz band ~900 MHz 6° x 6°









B vector map with RM = 25 rad/m^2 for correction





What do magnetic fields tell us about cosmic ray acceleration?



Soft X-Rays Hard X-Rays

Credit: NASA/CXC/Middlebury College/F.Winkler

Number of cosmic rays (logarithmic scale)



ASKAP (red) + Soft X-rays (green) + Hard X-rays (blue) CHANDRA



Older and more evolved supernova remnants -> Magnetic fields are tangential (ambient Galactic field has been compressed)





Younger (historical type) supernova remnants -> Magnetic fields are radial

Why?

SN1006 is a younger, historical type supernova remnant

Magnetic fields is not entirely radial

> In the process of evolving into the Sedov phase?



15 10 5 1 1 1 Y (kpc) 0 **RE** . 1 1 . 1 1 1 18 . 1 а. 1 -5 **TO SN1006** -10 -15 ^{|_} -20 -15 -10 -5 5 0 10 15 20

JF12 Galactic Magnetic Field Model (top down and side views)

X (kpc)

Galactic Magnetic Field Model of Jansson & Farrar 2012





Distance to SN1006 is 1.6 - 2.2 kpc

Cosmic Ray Electron Distribution



Simulated Synchrotron Emission



Quasi-perpendicular





Quasi-parallel











ASKAP-36 Feb. 2019



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Galactic Magnetic Field Model of Jansson & Farrar 2012





Distance to SN1006 is 1.6 - 2.2 kpc



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Next Steps

- Compare to the model
- RM gradients across the field?
- Polarization angle map
 - Need single dish short spacings
- New analysis of SN1006
 - High sensitivity data
 - Broad bandwidth -> RM synthesis



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Cross-matching RMs with other data sets

- No cross-matching of RMs currently in the scripts
- Plan to add average per field RM with all sky map
- SN1006 field measured: 7.7 ± 27.1 rad/m^2
- Oppermann: 8 ± 28 rad/m^2

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