

DUNLAP INSTITUTE for ASTRONOMY \& ASTROPHYSICS

## SN1006 Science with POSSUM

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## ASKAP SN1006 Test Field

 Observed February 2019 288 MHz band ~900 MHz $6^{\circ} \times 6^{\circ}$()
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(1) Astronomy \& Astrophysics
$B$ vector map with $\mathrm{RM}=25 \mathrm{rad} / \mathrm{m}^{\wedge} 2$ for correction



ASKAP (S. Vanderwoude)


What do magnetic fields tell us about cosmic ray acceleration?


# Soft X-Rays <br> Hard X-Rays 

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


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)


SN1006 is a younger, historical type supernova remnant

Magnetic fields is not entirely radial

In the process of evolving into the Sedov phase?


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


Galactic Magnetic Field Model of Jansson \& Farrar 2012


Distance to SN1006 is $\mathbf{1 . 6} \mathbf{- 2 . 2} \mathbf{~ k p c}$

Cosmic Ray Electron Distribution

Isotropic


Quasi-perpendicular


Quasi-parallel


Simulated Synchrotron Emission





S. Vanderwoude


SN1006 - SB8280 peak RM map


S. Vanderwoude

Galactic Magnetic Field Model of Jansson \& Farrar 2012


Distance to SN1006 is $\mathbf{1 . 6} \mathbf{- 2 . 2} \mathbf{~ k p c}$

S. Vanderwoude

## 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: $7.7 \pm 27.1 \mathrm{rad} / \mathrm{m}^{\wedge} 2$
- Oppermann: $8 \pm 28 \mathrm{rad} / \mathrm{m}^{\wedge} 2$



Reynoso et al. 2013


Quasi-perpendicular


Quasi-parallel

Current favoured model of SN1006 Katsuda+ 2017 review

## G327.6+14.6

$5 \sqrt{2}$
0.5


