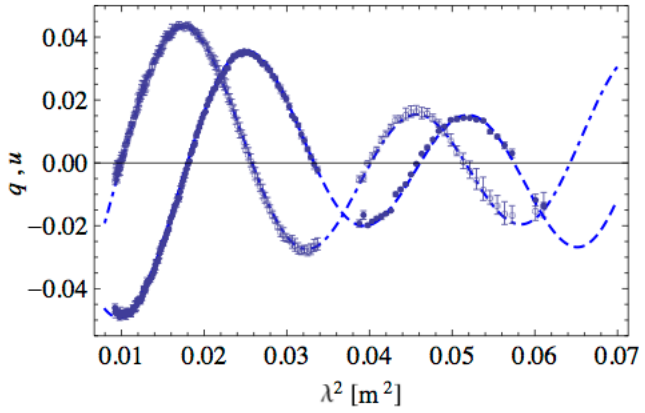
A Wideband Polarization Survey of the Extragalactic Sky at 2-4 GHz (Mao+)

- Polarization information is **free** with additional on and off-axis instrumental pol cal.
- Faraday rotation and depolarization is a sensitive probe of **n_e , B , turbulence**

$$\text{Faraday Depth} = 0.812 \int_{\text{source}}^{\text{observer}} n_e(l) B_{\parallel}(l)\, dl \quad \text{rad m}^{-2}$$

- Only **wideband** spectro-polarimetry can **break** degeneracy of depol behaviors



O'Sullivan+ 2012

- **Advantages going to 2-4 GHz**:
  - less severe λ-dependent depolarization
  - sensitive to extended structure in Faraday space (mixed thermal and synchrotron gas)
  - can probe larger Faraday depths
  - provides better Faraday space resolution when combined with WODAN, POSSUM

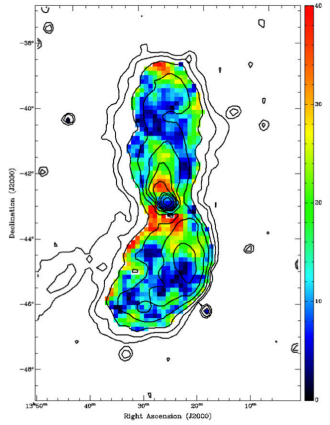
- expected polarized source counts:

shallow all-sky survey > 2.2×10^5 medium (2,000 deg^2) > 3.8×10^4

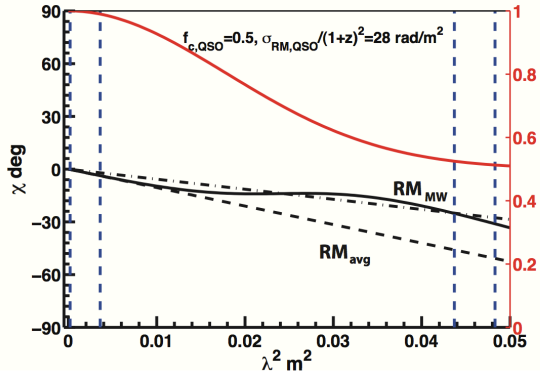
Deep (500 deg^2) > 1.7×10^4 ultra-deep (50 deg^2) > 3.8×10^3

Major Science Drivers

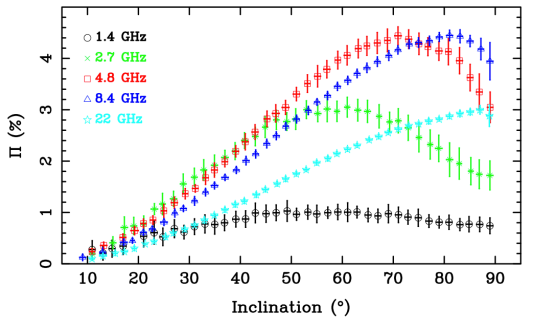
- Discover new classes of polarized sources
  - extremely turbulent environments: inner regions of jets, cores of massive galaxy clusters, starbursts etc. (Arshakian & Beck 2011)
- Probe of thermal gas content in radio galaxies
  - mass entrainment in flows + AGN feedbacks (O'Sullivan+ 2013)
- Probe of physical properties in absorption line systems
  - covering fraction + turbulent properties (Bernet+2012)
- Apply polarization k-correction
  - redshift correction to obtain intrinsic source properties
- Pol. source count at the low flux density end
- Integrated polarization properties of galaxies
  - evolution of B field in galaxies (e.g. Stil 2009)



O'Sullivan+ 2013



Bernet+ 2012



Sun & Reich 2012