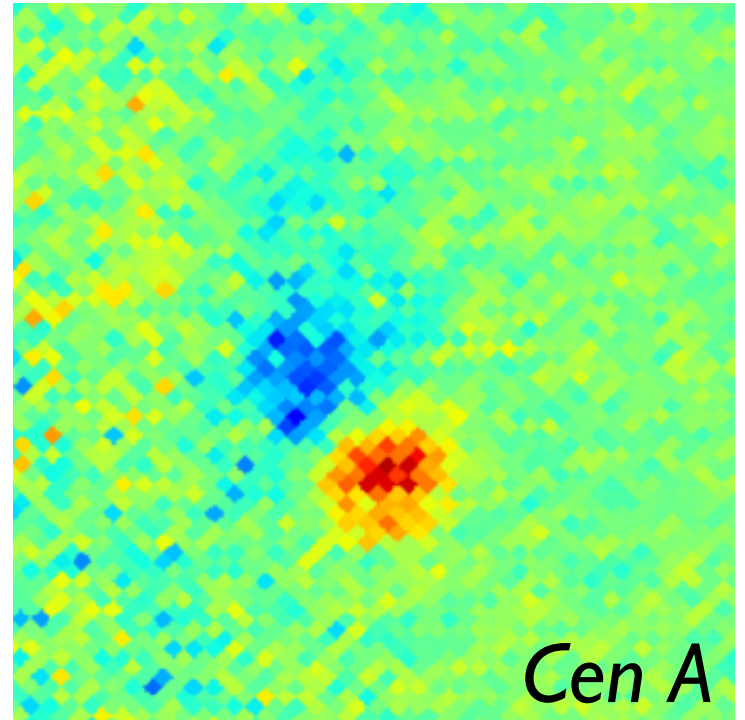
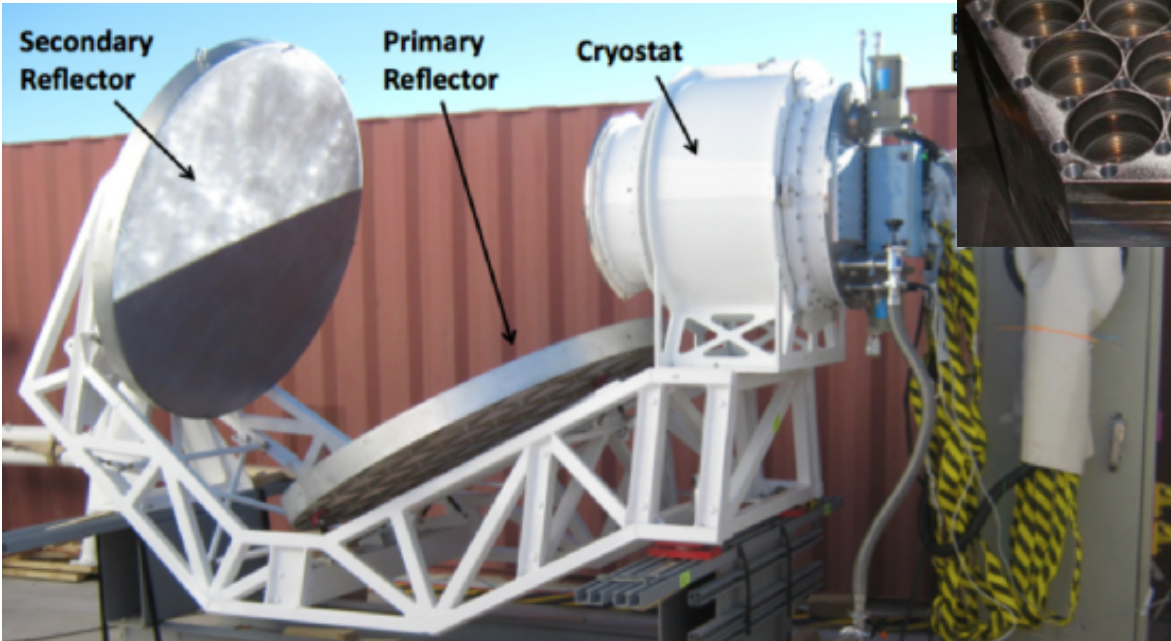


# Polarization measurements of radio sources at 43 and 95 GHz with QUIET

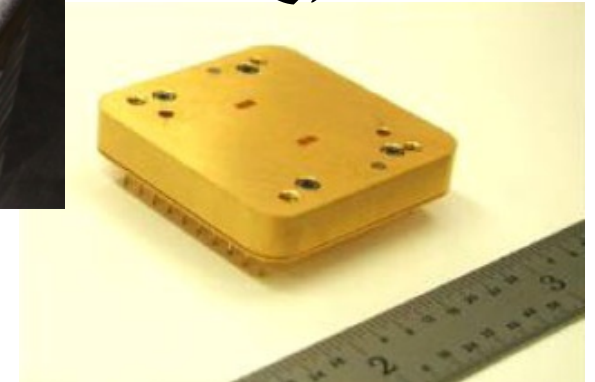
*Kevin Huffenberger  
Florida State University*



# QUIET = Q/U Imaging Experiment



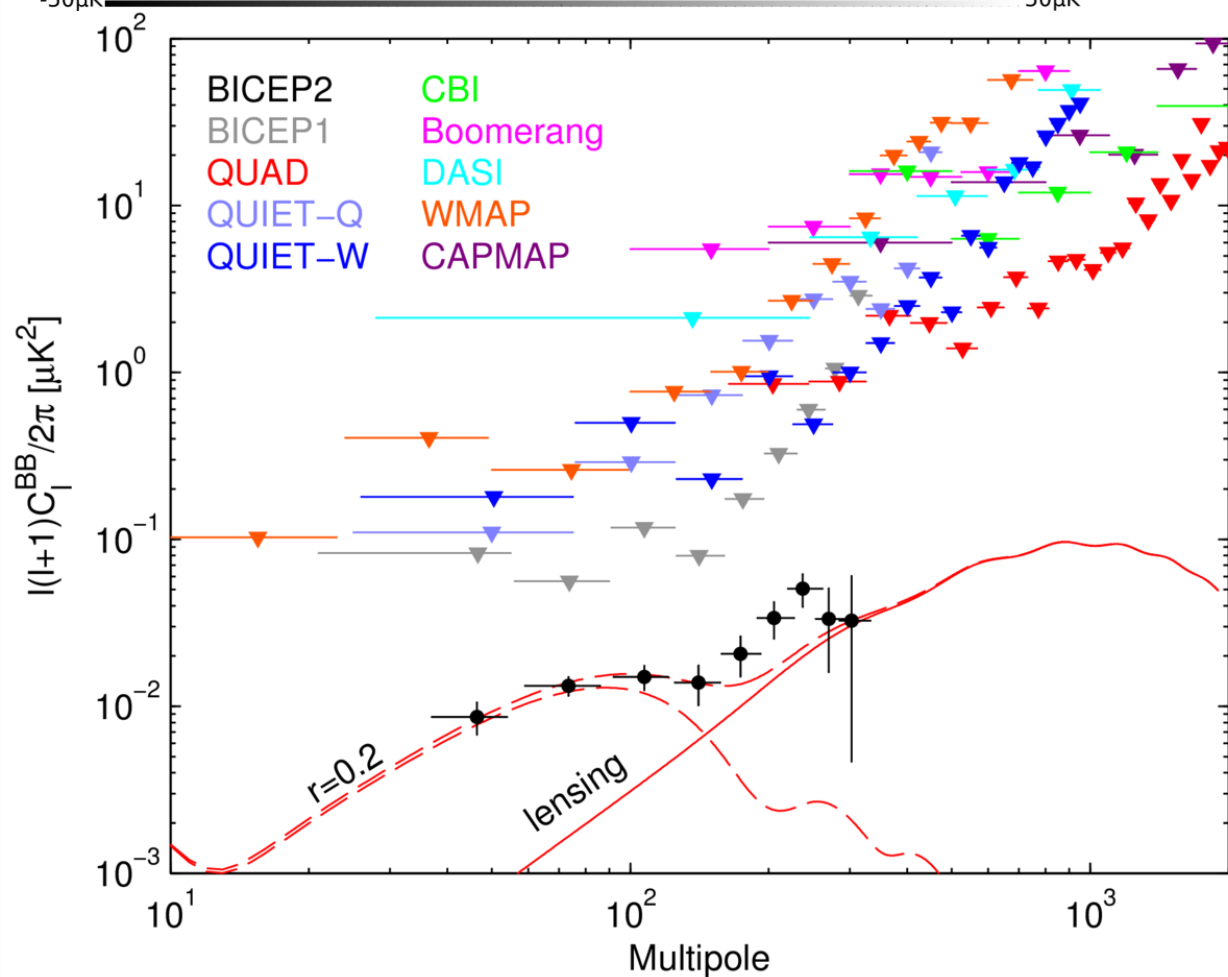
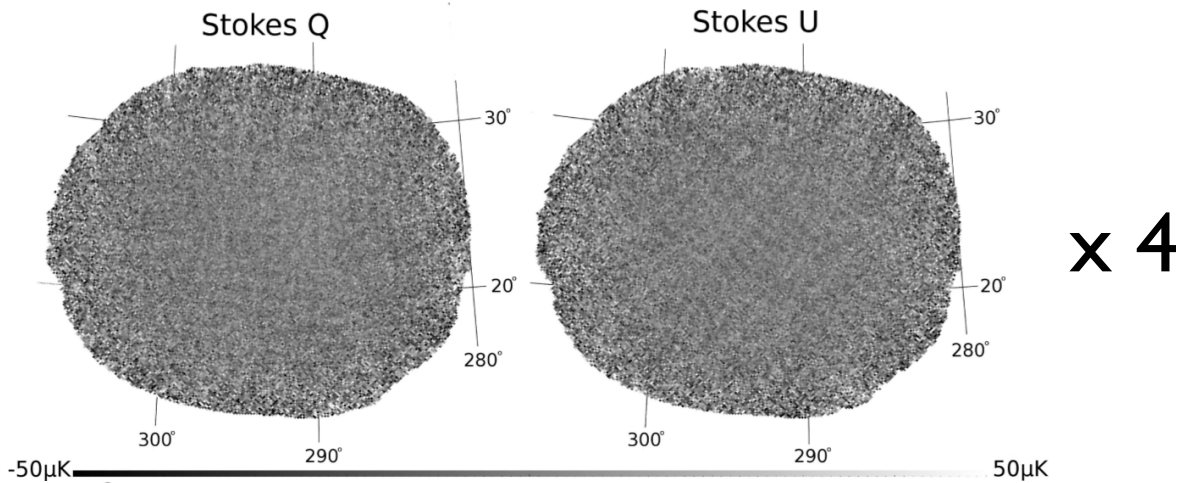
Q,U not I



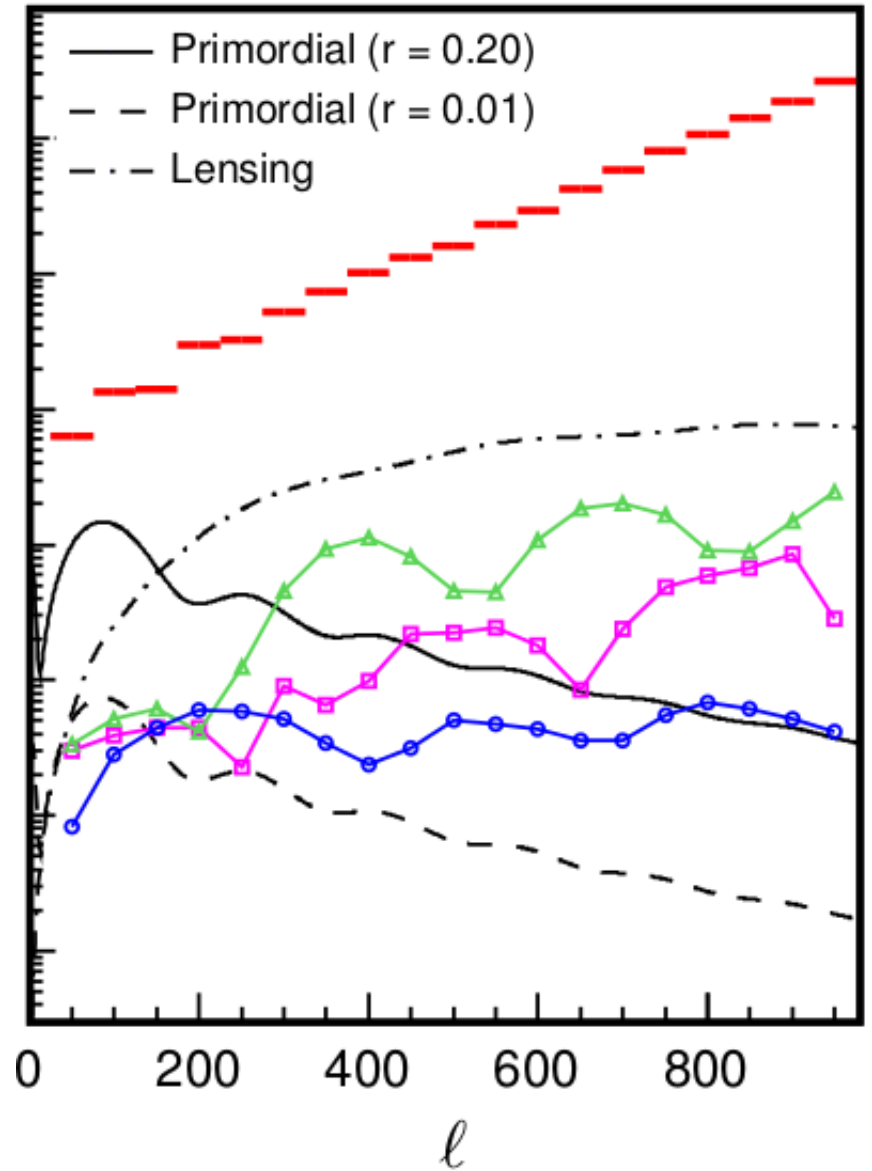
Q band: 43 GHz  
W band: 95 GHz



# QUIET CMB Results



*BB*



## Systematic Errors

- Absolute Responsivity, Window Function
- I to Q/U Leakage
- △ Angle, Relative Responsivity, Pointing
- Scan-synchronous Signal, Far Sidelobes

# Cen A



not to scale

Q band 43 GHz

W band 95 GHz

Stokes Q

Stokes U



4°

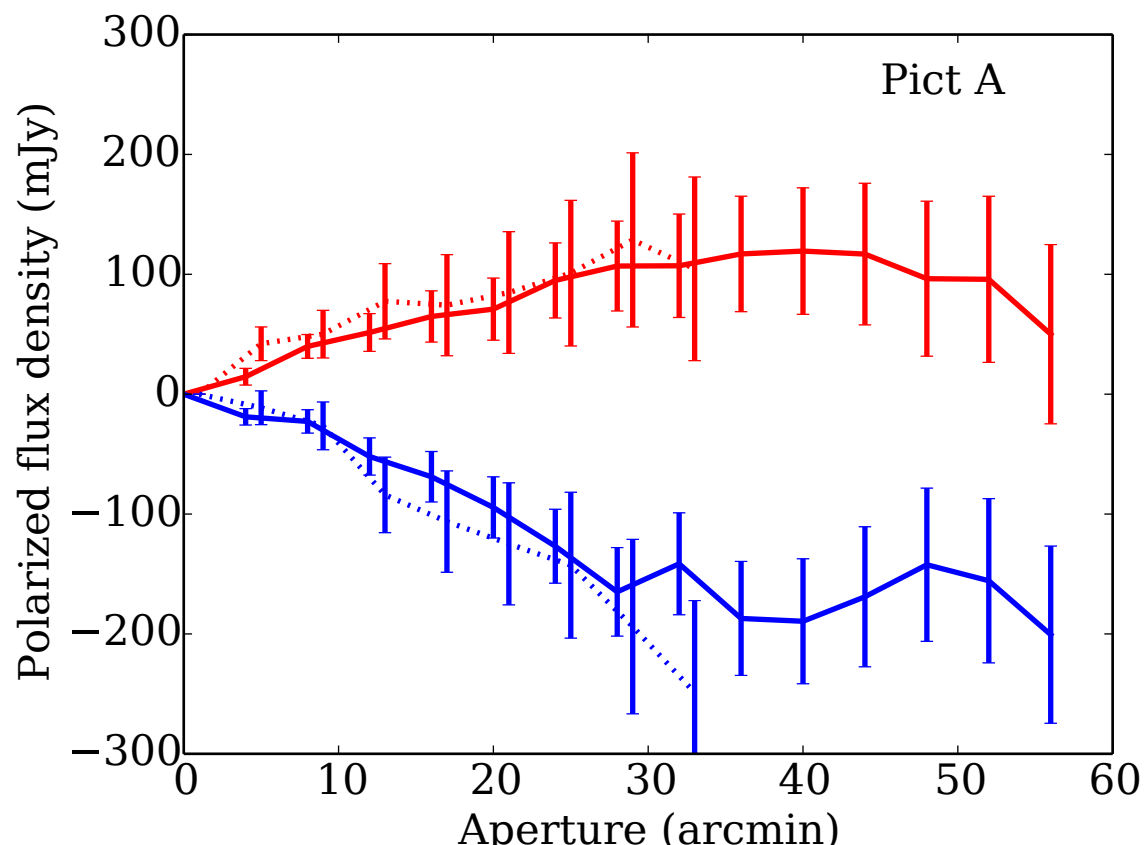
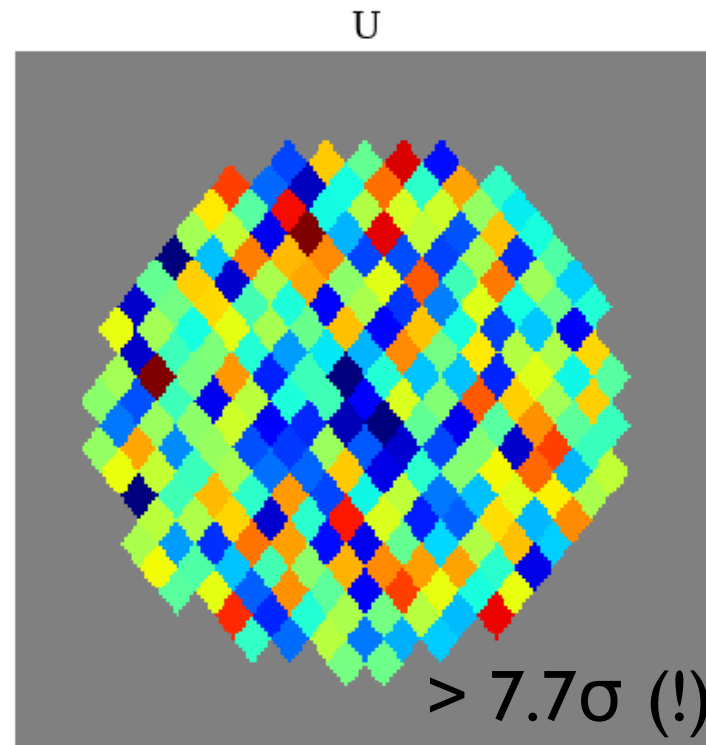
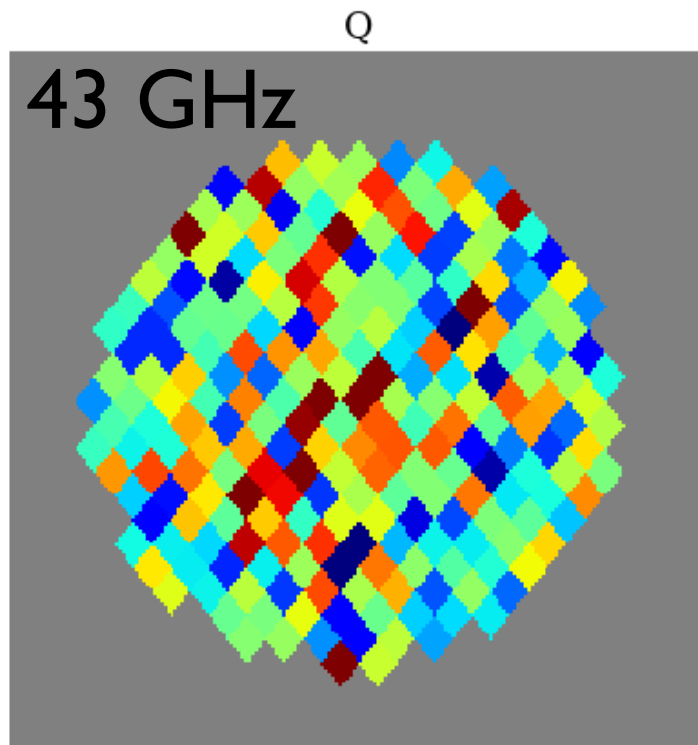
Q, U gal coords  
CMB convention

# Pict A

Lobe sep.  
 $\sim 8'$

beams:  
 $27'$  &  $13'$

$1^\circ$



$-50$   $50 \mu\text{K}$

Stokes Q

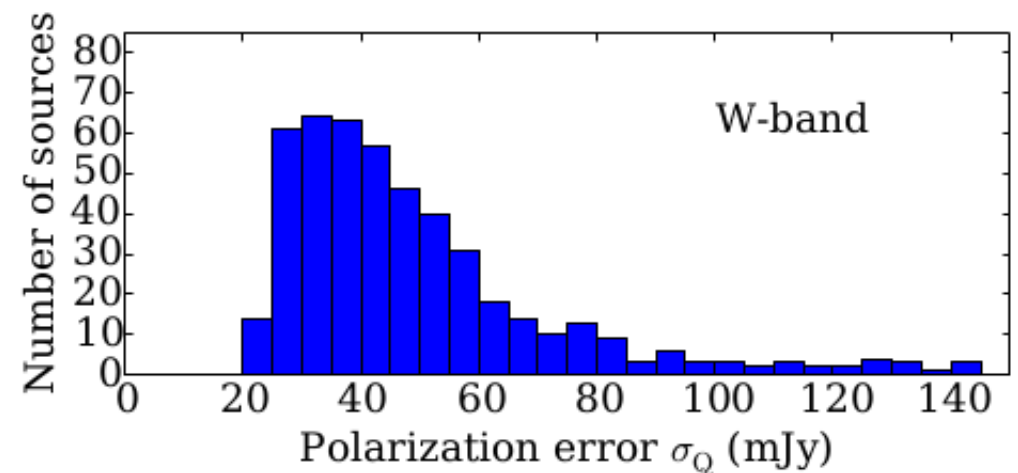
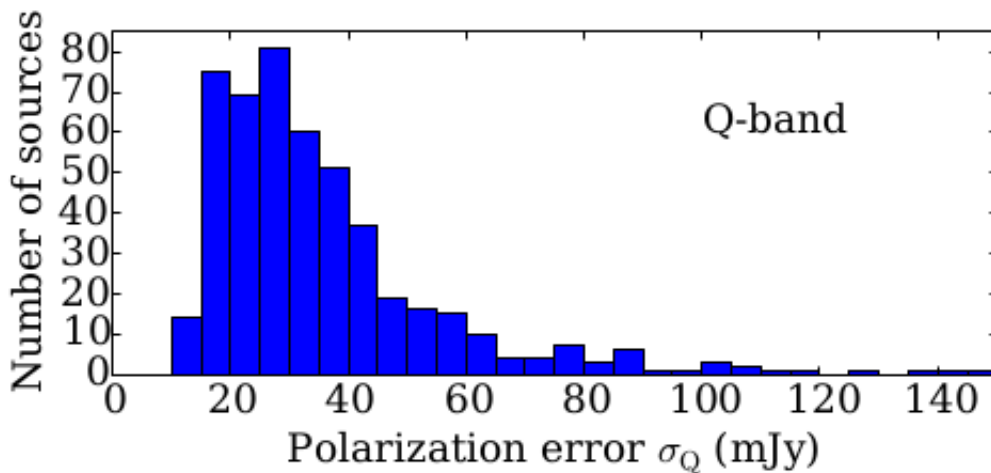
Stokes U



# Method for point-like sources

1. Build template for source shape (beam/psf + pix win.)

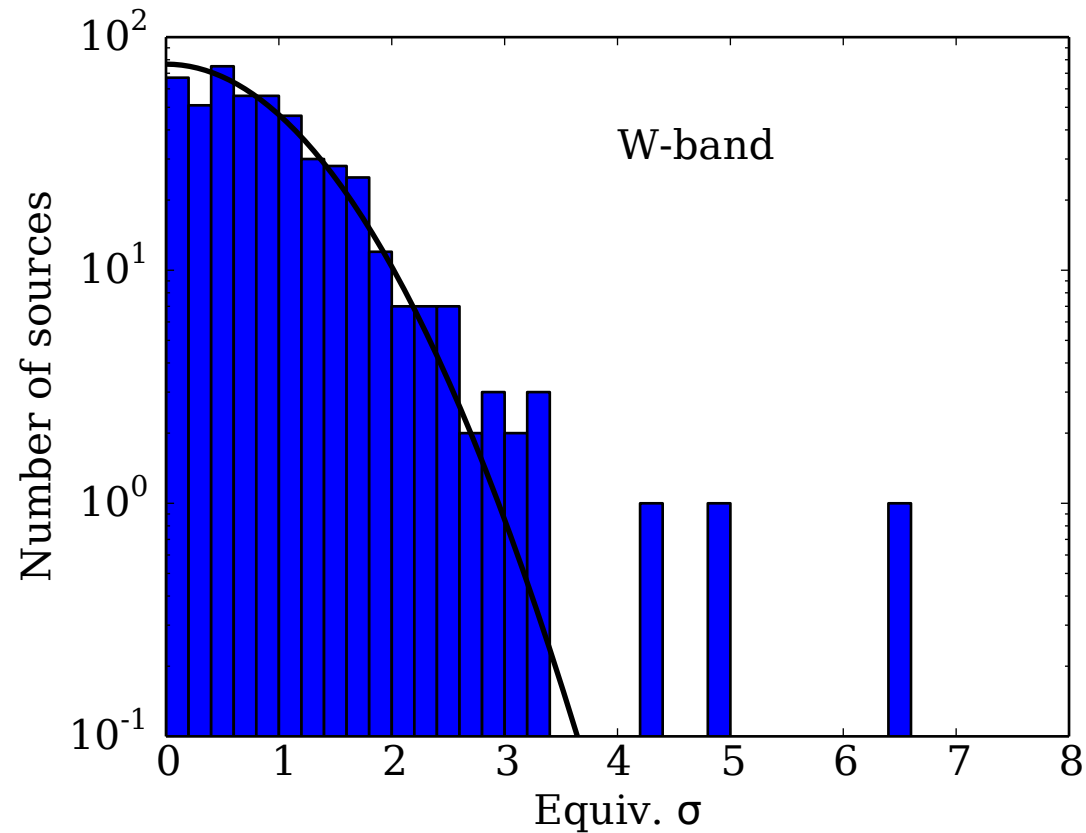
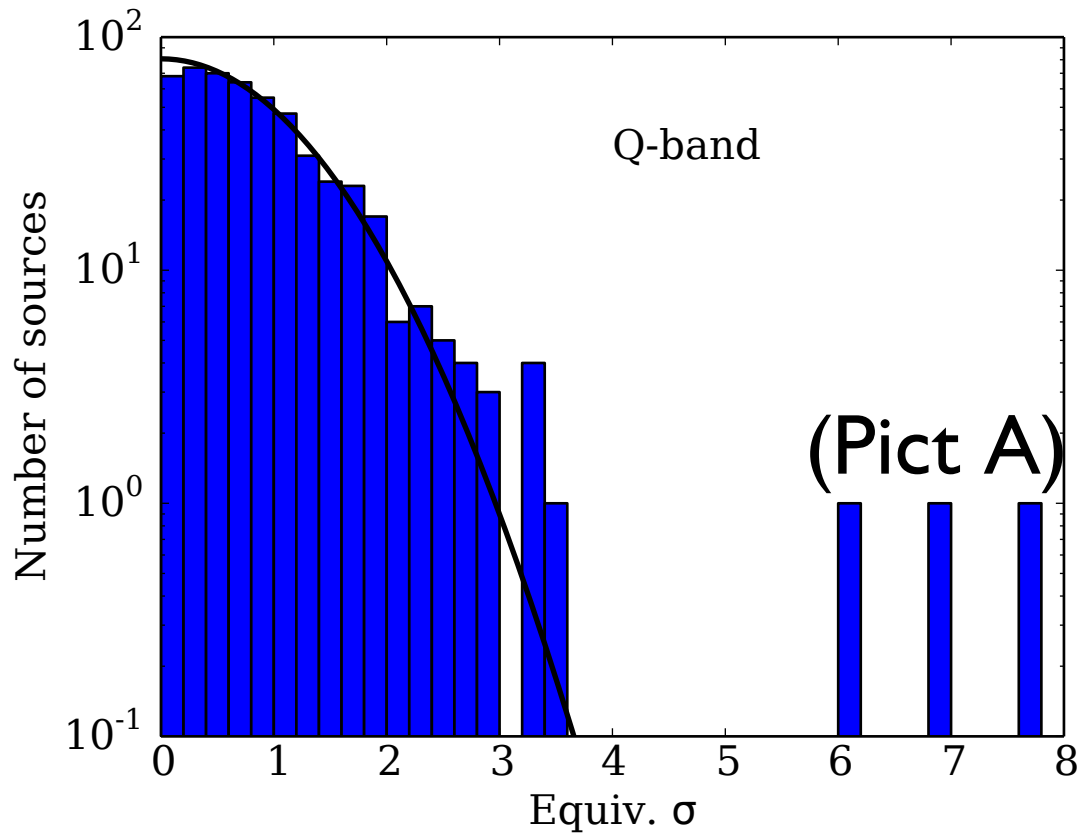
2. Measure Stokes Q,U on ~480 sources from Australia Telescope 20 GHz survey (all  $> 5\sigma$ ) (Murphy+ 2010)



3. Evaluate probability by chance of measurement

4. MC, ML measurement of polarization magnitude

# Number vs significance

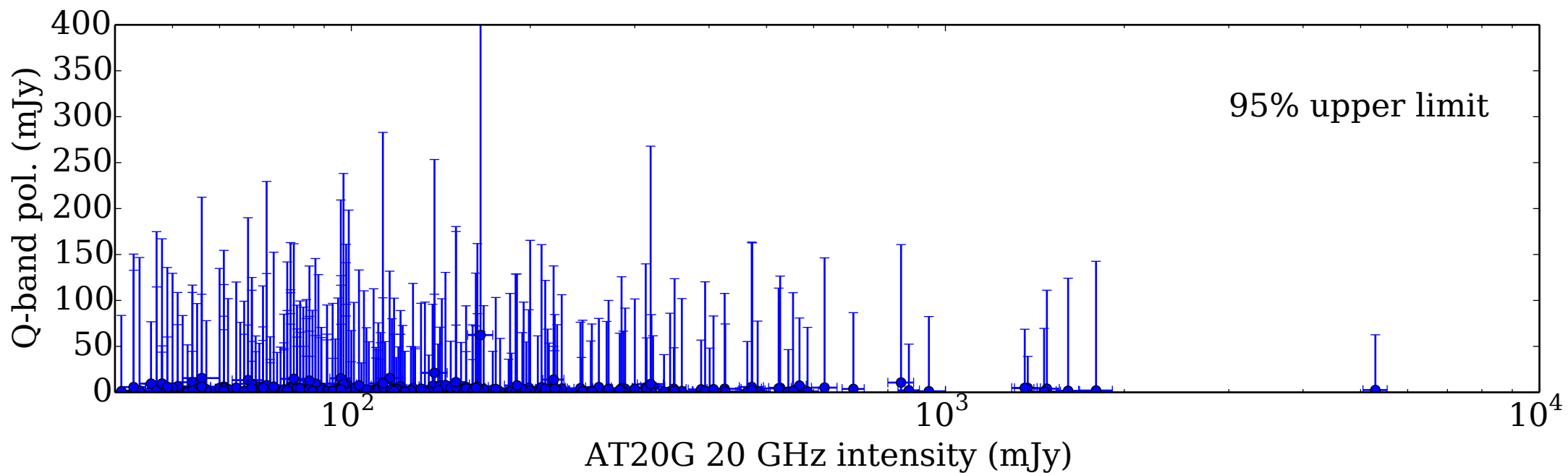
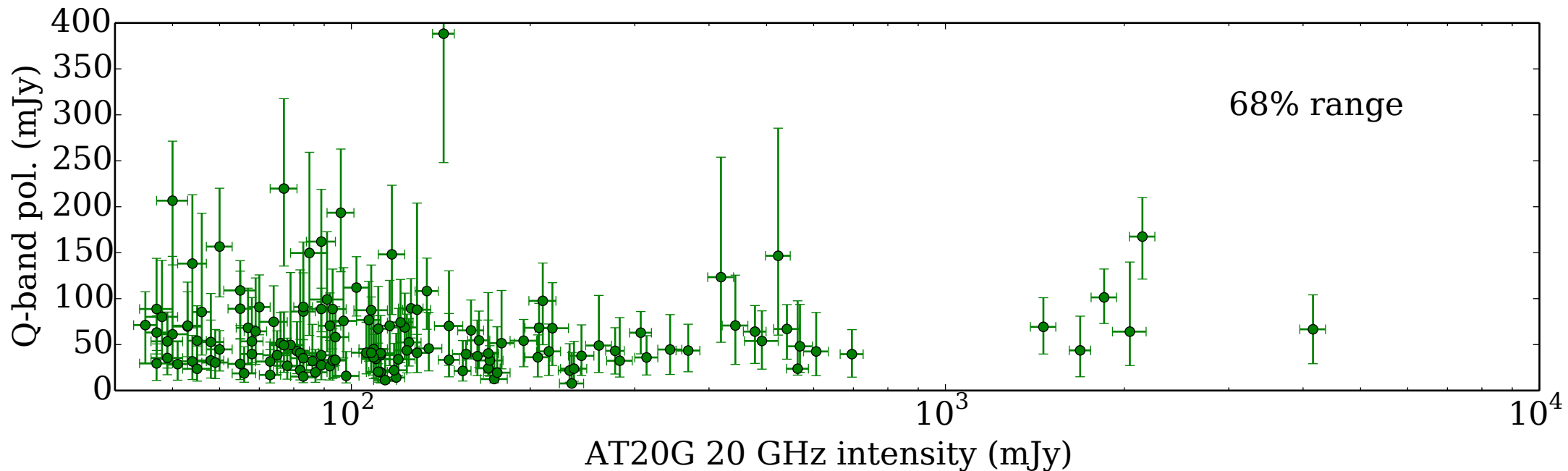


Expect 3.3 sources at  $> 2.7 \sigma$  from noise alone

43 GHz: found 11

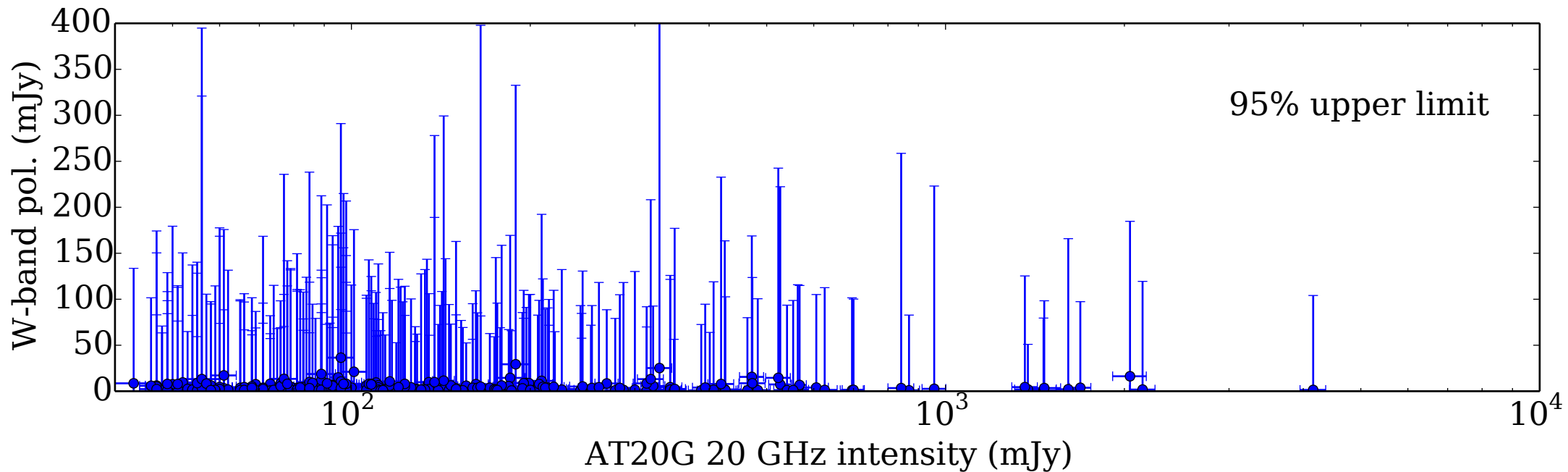
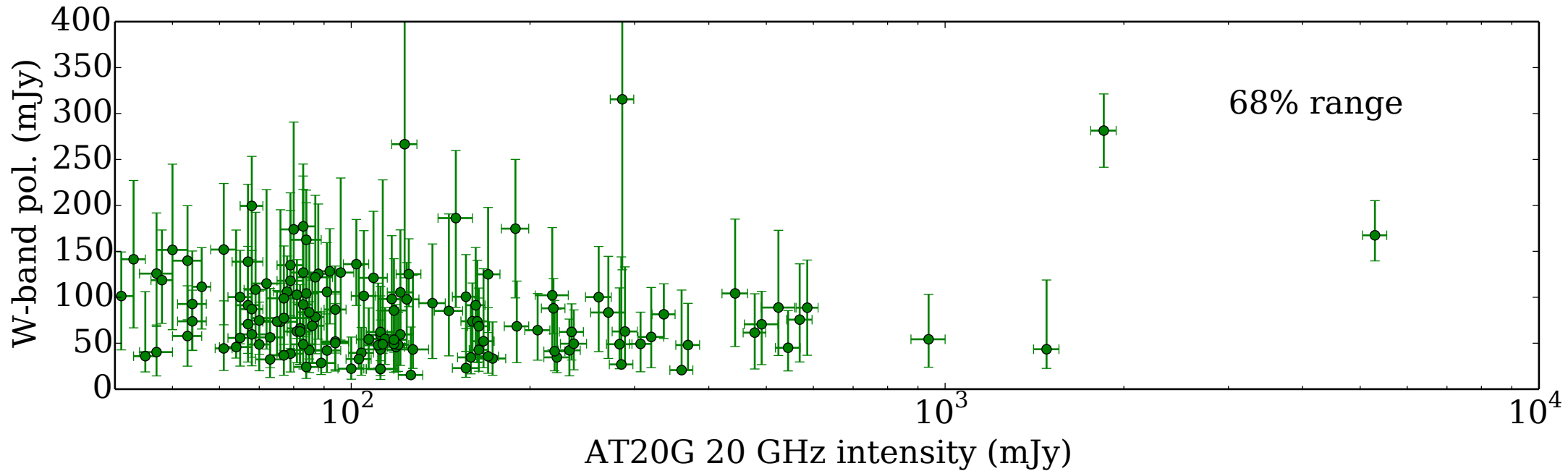
95 GHz: found 12

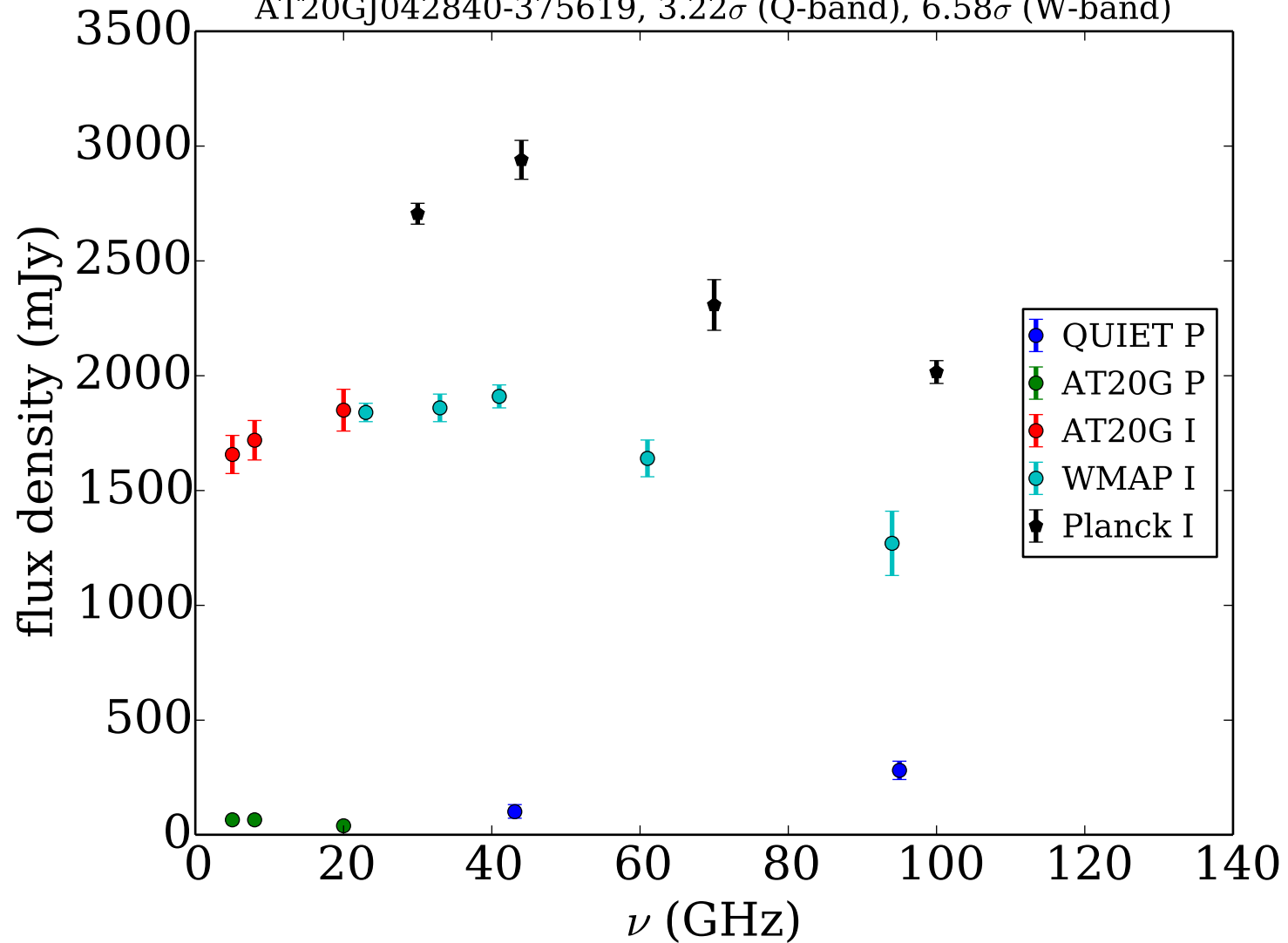
# 43 GHz polarization vs 20 GHz intensity





# 95 GHz polarization vs 20 GHz intensity



AT20GJ042840-375619,  $3.22\sigma$  (Q-band),  $6.58\sigma$  (W-band)

AT20GJ123045-312123,  $3.29\sigma$  (Q-band),  $2.78\sigma$  (W-band)

flux density (mJy)

200

150

100

50

0

20

40

60

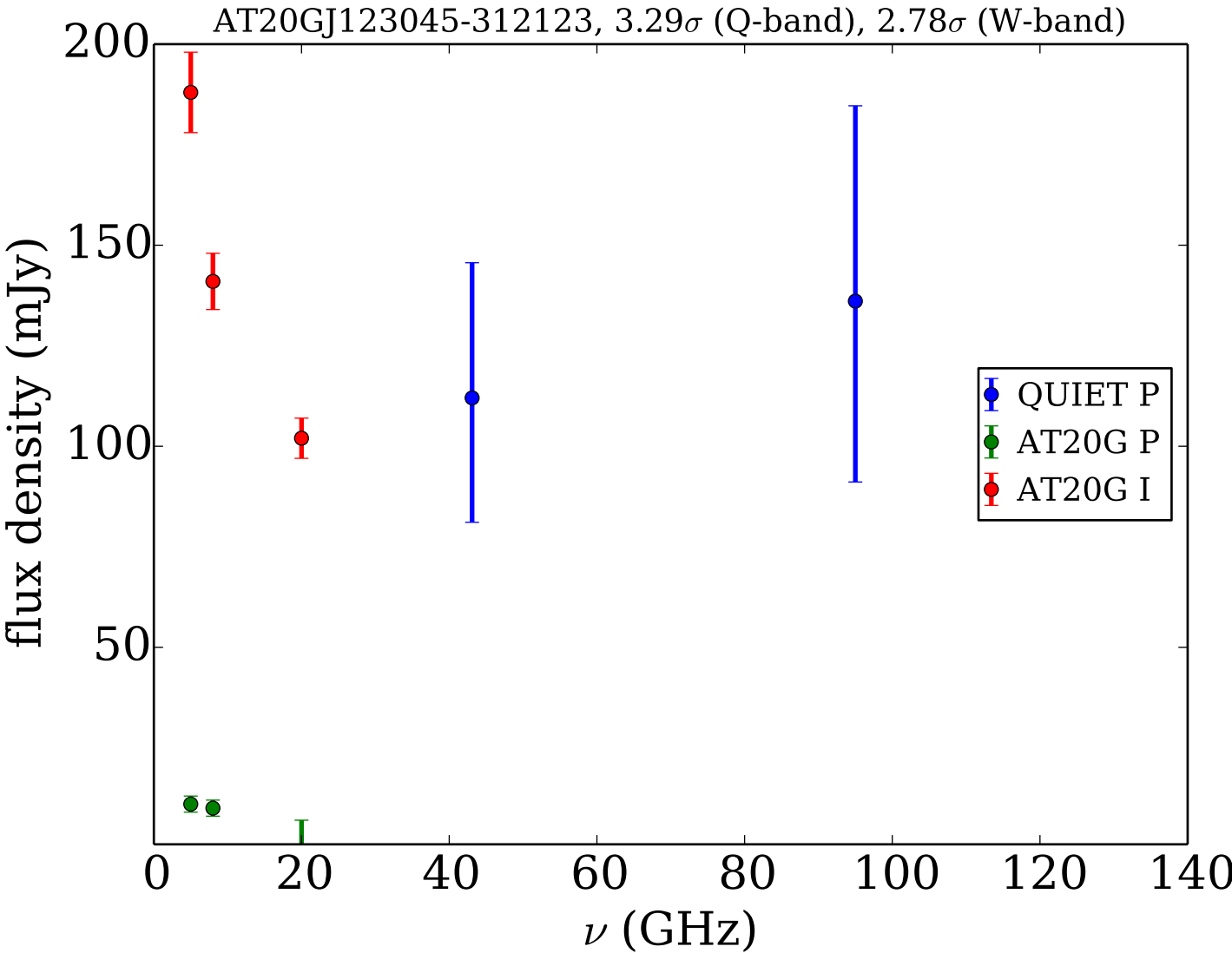
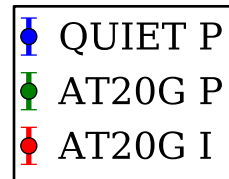
80

100

120

140

$\nu$  (GHz)



# Conclusions

QUIET measured polarization at the locations of ~480 radio sources at 43 GHz and 95 GHz.

Several detections of polarized emission; many upper limits.

No immediately clear trend between 20 GHz intensity and higher frequency polarization.

SEDs of sources are diverse and interesting.

Look for our catalog on arxiv this summer!