

# PRELIMINARY VLA SNAPSHOTS OF SOUTHERN RADIO SOURCES FROM THE PARKES-MIT-NRAO (PMN) SURVEY

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**Abstract.** Selection criteria for 1800 MIT-VLA snapshots of PMN radio sources are described, and 6 new MG & PMN lens candidates are presented.

## 1. Sample Selection

The Parkes-MIT-NRAO (PMN) Southern Hemisphere Sky Survey revealed 36,640 sources over  $\Omega = 4.51$  sr, and is  $> 95\%$  complete and  $> 90\%$  reliable down to  $S_{4.85\text{GHz}} \approx 35$  mJy (Griffith et al. 1995). We have made 1800  $0.25''$ -resolution 8.4 GHz VLA snapshots of PMN sources ( $S_{4.85\text{GHz}} > 90$  mJy) in the  $-30^\circ < \delta < 0^\circ$  strip ( $|b| > 10^\circ$ ). This sample is essentially complete down to  $S_{4.85\text{GHz}} \approx 200$  mJy, and is divided roughly equally into a flat-spectrum sample ( $S_\nu \propto \nu^{-\alpha}$ ;  $\alpha < 0.5$ ), and a purely flux-limited one. Our Northern VLA campaign in the  $0^\circ < \delta < 37^\circ$  strip of the MIT-Greenbank (MG) Surveys (Griffith et al. 1991) produced 5 confirmed lenses from  $\approx 4000$  snapshots: MG2016, MG1131, MG0414, MG1654 and MG1549.

## 2. New Results

Improvements in the MIT mapping pipeline (Conner et al. 1992) have uncovered several more good candidates, yielding a lensing frequency of  $\approx 1/500$ . Our initial candidate selection is by radio morphology. The 6 most promising cases from a new crop of 8.4 GHz MG & PMN snapshots are shown in Fig. 1. Optical R band imaging with the Michigan-Dartmouth-MIT 1.3m telescope has secured identifications ( $R > 22.5$ ) for all 6 candi-

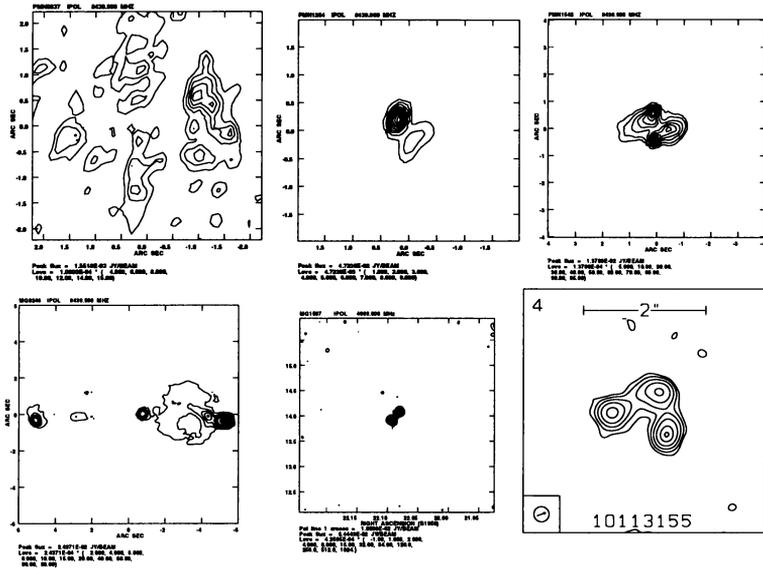


Figure 1. VLA 8.4 GHz plots of 3 new PMN & 3 new MG gravitational lens candidates.

dates. MG0246 is almost certainly an Einstein Ring. MG1507 is just one of  $\approx 130$  ‘close doubles’ ( $0.25'' < \theta < 2.0''$ ) in the 8.4 GHz database. It is not yet understood what these tiny radio galaxies are physically; it is likely that they are the lobes of distant, young or ‘frustrated’ classical doubles, but perhaps a few are doubly-imaged background radio sources. Theoretical predictions (Turner et al. 1984) that small angular size lenses should exist have been corroborated by several recent discoveries, e.g. the  $0.33''$  ring B0218+35.7 (Patnaik et al. 1993). Further optical imaging and spectroscopy is required to investigate the lensing hypothesis for these new MIT candidates.

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## References

- Conner, S.R., Fletcher, A., Herold, L., & Burke, B.F., 1992, in *Sub-arcsecond Radio Astronomy*, eds. R.J. Davis & R.S. Booth (Cambridge: Cambridge Univ. Press), 154  
 Griffith, M.R., Langston, G., Heflin, M., Conner, S., & Burke, B., 1991, *ApJS*, 75, 801  
 Griffith, M.R., Wright, A.E., Burke, B.F., & Ekers, R.D., 1995, *ApJS*, 97, 347  
 Patnaik, A.R., Browne, I.W.A., King, L.J., Muxlow, T.W.B., et al., *MNRAS*, 261, 435  
 Turner, E., Ostriker, J., & Gott, R., 1984, *ApJ*, 284, 1