A VLA/MERLIN/VLBA FOR INTERMEDIATE SCALE LENSES AND THE DISCOVERY OF A NEW LENS SYSTEM?

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We are searching for small lens systems (50-250 mas or $10^8 - 10^9\ M_\odot$) in a sample of $\sim$ 1800 flat spectrum radio sources. This is the first time a systematic search has been made "between" the VLA and VLBI resolutions. Finding any would indicate the existence of other than the "conventional" spiral/elliptical lenses (only $\sim$ 0.01% chance - Turner et al. (1984)). For example, *faint galaxies* are numerous ($\sim 10^6$ gal/deg^2 - Lilly (1993), Glazebrook et al. 1995), compact (HST Medium Deep Survey (MDS) - Griffiths et al. 1994) and ideally placed for lensing ($< z > \sim 0.6$ - MDS, Smail et al. (1994); *c.f.* Turner et al. 1984). Early-type *dwarf galaxies* (dE,N and cE), if extant at intermediate-z as favored by MDS are also obvious lens candidates. If no lenses are found, a limit 400 times better than the current one (Surdej et al. 1993), $\Omega_L < 0.001$, will be placed on the cosmological density of compact objects (*e.g.* black holes) for the above mass range.

From the JVAS (Patnaik et al. 1992) and the Cosmic Lens All Sky Survey (CLASS) (Browne et al. this volume) - we selected a parent sample of $\sim$ 1800 objects satisfying $\alpha_{1.4-5} < 0.50$ ($S_\nu \propto \nu^{-\alpha}$), $S_{8.4}^{total} \geq 100$ mJy and $|b^{II}| \geq 10°$. The 67 "candidates" were selected from the visibility plots (the sources >50 mas) and constitute an interesting population: two thirds of the candidates have $\alpha \sim 0.3 - 0.4$ whereas the parent sample has $< \alpha > = 0.0$; in addition, the candidate sample is clearly dominated by empty fields (40%) whereas the parent sample has 60% of QSOs.

Our 67 candidates were mapped with MERLIN "snapshots" at 5 GHz (4 × 15 min.). About 20 sources look very interesting for subsequent VLBA follow-up; the great majority of the remaining appear to be "core-jets".

One arcsecond scale source, 2114+022, looked promising enough for long track MERLIN observations (see Fig.1) and it is a good lens candidate despite its very strange configuration; there will be a multi-frequency VLBA follow-up.

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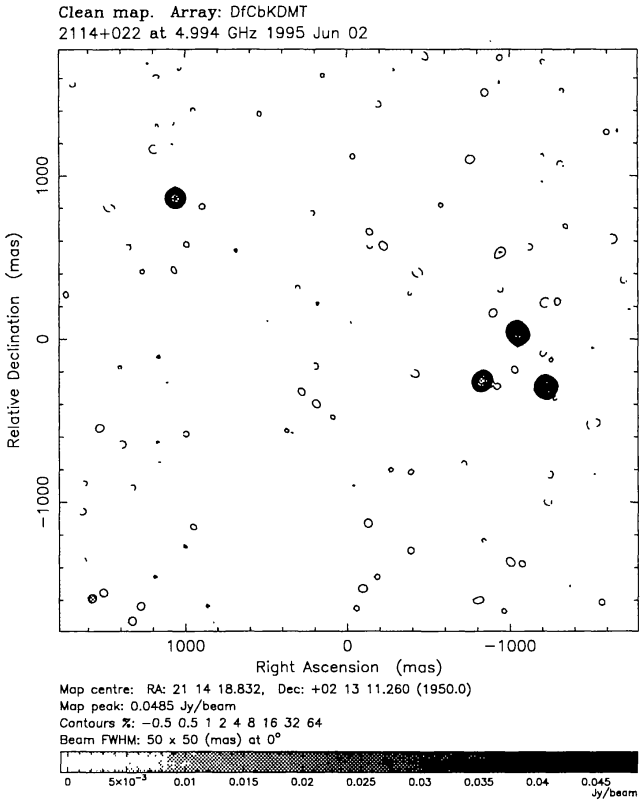

Figure 1. MERLIN map of 2114+022 at 5 GHz (11hrs. phase-referencing). The noise level is very low (< 0.1 mJy) and there are no signs of any extended structure; all the four images are unresolved. The (variable?) fluxes of the components are, starting from the east (left): 20 mJy (21 mJy - snapshot 10 days after), 13 mJy (10 mJy), 50 mJy (45 mJy), 66 mJy (60 mJy); the spectral indexes are: $\alpha_{1.6-5} = 0.32$ and $\alpha_{5-8.4} = 0.95$, $\alpha_{1.6-5} = -0.30$ and $\alpha_{5-8.4} = -0.87$, $\alpha_{1.6-5} = -0.65$ and $\alpha_{5-8.4} = 0.42$, $\alpha_{1.6-5} = 0.03$ and $\alpha_{5-8.4} = 0.78$. The optical identification (POSS) - 19^m elliptical red "blob" (optical counter-parts?) - is only 21° misaligned with the NE-SW radio-alignment.

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