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Fresh results from modelling the gravitationally lensed system PKS 1830-211

S. Nair[1] and M. A. Garrett[2]

[1]*Raman Research Institute, Bangalore 560 080, India*

[2]*Joint Institute for VLBI in Europe, Postbus 2, 7990 AA Dwingeloo, The Netherlands*

Abstract. Fresh modelling of PKS1830-211 points to a perturbation in the NE image by a lens of globular cluster scale.

Keywords: galaxies - individual (PKS1830-211), gravitational millilensing

1. Modelling results

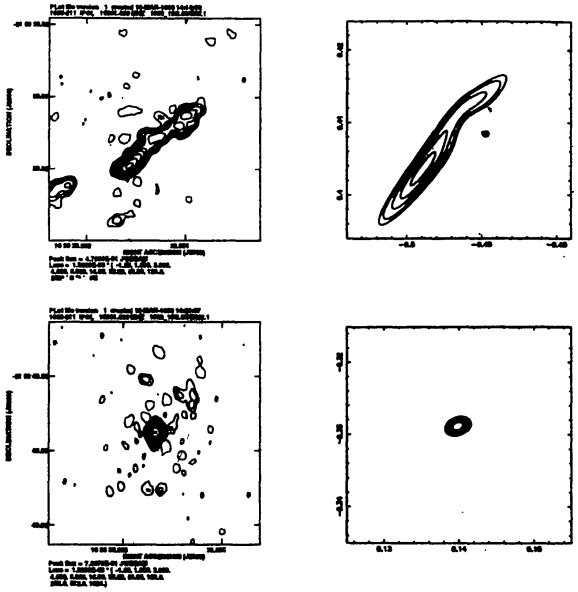

Figure 1. Left : 15 GHz VLBA observations of the northeastern or NE (top) and southwestern or SW (bottom) images of the core, with resolution ~ $(1\text{mas})^2$ (Garrett et al. 1996). Right: Rudimentary simulation with the source as a single, circular gaussian brightness distribution, centred on the position of the source's core. Multiple imaging occurs at the tip of the NE simulated image.

The discovery of a secondary lens at $z = 0.19$ along the line of sight to PKS1830-211 (Lovell et al. 1996), and the unexpected 15 mas scale 'counterjet' - like feature seen only in the NE image in 15 GHz VLBA observations (Garrett et al. 1996) - which in the source would lie opposite to the direction of the larger scale (~ 100s mas) jet (e.g. Nair et al. 1993) - provide new inputs to our lens modelling. We find that the hitherto unexplained ' counterjet' may be readily understood as arising from a perturbation of the NE image on mas scale by a secondary lens (modelled as a SIS) of central 1-D velocity dispersion ~ 5 km/s. Figs. 1 & 2 show the 15 GHz observations and details of the modelling results.

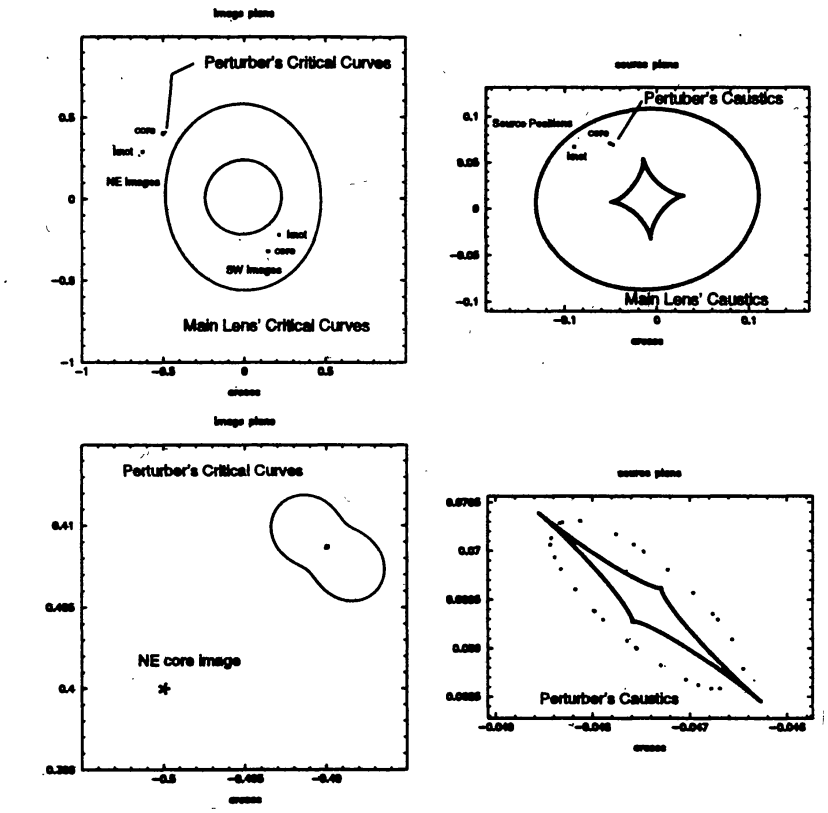

Figure 2. Top : Image plane critical curves (left) and source plane caustics (right) for the main lens. The minute Critical curves and caustics of the perturbing lens are also shown. (Bottom) The perturbing lens' critical curves (left) and caustics (right), expanded. The source is centred at (–0.050, 0.071).

References

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