We report the discovery of a new quadruply imaged quasar surrounded by an optical Einstein ring candidate. Spectra of the different components of 1RXS J113155.4−123155 reveal a source at $z = 0.658$. Up to now, this object is the closest known gravitationally lensed quasar. The lensing galaxy is clearly detected. Its redshift is measured to be $z = 0.295$. Additionally, the total V magnitude of the system has varied by 0.3 mag between two epochs separated by 33 weeks. The measured relative astrometry of the lensed images is best fitted with an SIS model plus shear. This modeling suggests very high magnification of the source (up to 50 for the total magnification) and predicts flux ratios between the lensed images significantly different from what is actually observed. This suggests that the lensed images may be affected by a combination of micro or milli-lensing and dust extinction effects.

gravitational lens – quasar – cosmology

Introduction

The peculiar and complex morphology of the source 1RXS J113155.4−123155 (hereafter J1131GL) has been serendipitously unveiled during polarimetric imaging of a sample of radio quasars carried out in May 2002 at ESO, La Silla. These observations are reported in Section sec:Diap together with additional optical imaging obtained in December 2002. Astrometry and photometry of the gravitational lens system are also described. In Section sec:spec, we present spectroscopic observations of the source, the lens and a nearby companion (hereafter J1131b). Section sec:mod is devoted to a simple lens model and Section sec:end summarizes why this new gravitational lens is a particularly interesting one. We have adopted throughout the paper $H_0 = 65$ km s$^{-1}$ Mpc$^{-1}$, $\Omega_0 = 0.3$ and $\lambda_0 = 0.7$.

Direct imaging, astrometry and photometry sec:Diap

Direct imaging of J1131GL has been obtained at two different epochs with respectively EFOSC-2 at the 3.6 m telescope and EMMI-Red at the 3.5 m New Technology Telescope (NTT) at the La Silla observatory. On May 2, 2002, we resolved the four components of J1131GL on a set of 2×4 polarimetric images (corresponding to 4 different orientations of the Half Wave Plate and 2×150 s integration time per orientation) taken through a combined V-band + Wollaston prism. The average seeing measured on the frames is 1.1 and the pixel size is 0.158. Additional V and R images of J1131GL have also been obtained under poor seeing conditions (1.6) on December 18, 2002. The coadded exposure time amounts to 480 s in V and 960 s in R. The pixel size is 0.166.

figure* [tb] [bb=36 398 577 570, width=15.4cm]figure1.ps (a) V direct image of J1131GL obtained with EFOSC-2 (4×150 s integration time). The 4 lensed images and the deflecting galaxy are identified on this CCD frame. (b) Deconvolved image using the MCS method (see text) and (c) Idem but with the quasar images removed. A conspicuous Einstein ring candidate is seen on the deconvolved images. fig:lens1