New VLA observations of the CLASS gravitational lens 1608+656

E. Xanthopoulos[1], I. W. Browne[1], and C. Fassnacht[2]

[1] NRAL Jodrell Bank, Macclessfield, Cheshire, SK11 9DL
[2] Palomar Observatory, California Institute of Technology, 105-24, Pasadena, CA 91125

The quadruply-imaged gravitational lens 1608+656 was discovered as part of the Cosmic Lens All Sky Survey (CLASS; Myers et al. 1996), a large-scale search for gravitational lenses among flat-spectrum radio sources using the VLA. The lens consists of four components with a maximum separation between individual components of 2.1". The lensed source is found to be the nucleus of a radio galaxy with double-lobed structure of unusually large physical dimensions and a luminosity at the Fanaroff-Riley class I-II transition. The background source has a redshift of z=1.394 and it is a poststarburst radio galaxy and not a quasar. The lensing galaxy has been found to have a redshift of z=0.6304 and a simple mass model is able to fit the observations.

With three of the four pieces of information available (the redshift of the lens, the redshift of the background source, and a working mass model), and the fourth one (time delays) in progress, 1608+656 is a prominent candidate for the determination of H_0.

As mentioned, the lensed object is not what would one expect for the host of a relatively powerful radio source, it is a poststarburst galaxy (E+A). These galaxies are composed of old stars typical of elliptical galaxies and stars thought to have formed in a burst within the past 10^9 years. The burst of star formation may have been triggered by ram pressure compression of gas in clusters or through galaxy-galaxy interactions and/or mergers. Because mergers and interactions maybe a cause for the onset of radio emission in galaxy nuclei, it is also possible that the same mechanism that produced this E+A galaxy is also responsible for the origin of the nuclear radio source.

At 92 cm (0.325 GHz) the radio source was found to be extended by about 1' in P.A. $\approx 30°$. Here we present new VLA B-configuration maps of 1608+656 in the L,C,U,X bands (1.5, 5, 8.3 and 15 GHz respectively). The purpose of the project was to investigate the lower surface brightness extended structure of this unusual lensed source.

C-band, U-band and X-band images are presented in the following page. The L-band data are still in the process of reduction. The C-band map reveals the extended structure found at 92 cm with two lobe-like structures and possible hot spots at the end of the lobes. The hot spot at the South-West corresponds to the compact component at the same distance visible in the A-configuration 5 GHz map where the lens is also resolved into its four components. The 15 GHz U-band map shows the four components of the lens while there is a point-like feature to the south of the two top components also seen present in the A-configuration 5 GHz map. The 8.5 GHz map does not resolve the four components and has a similar structure seen in the 1.4 GHz map. No jets have been found in any of these three bands. However, the L-band map which is in the procees of creation may hint to the presence of a possible jet.

Acknowledgments: This research was supported by the European Commission, TMR Programme, Research Network Contract ERBFMRXCT96-0034 'CERES'.

C-band, X-band and U-band B-configuration VLA maps of 1608+656