3C 279 underwent a major outburst, reaching a peak magnitude of Pg=13.67 in March of 1988. As of May 1989, it had not returned to its pre-outburst level. Prior to 1971, the Harvard sky patrol plates recorded two major outbursts - one in the late 1930's and the other in the early 1940's. In this paper, the RHO observations of 3C 279 from 1971 to the present will be presented along with the historical data. The energetics of the three outbursts will be discussed. This program has been supported by NSF grant AST-8516269.

31.11

Parsec-Scale Structure of 3C 273 at 22 GHz

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We present the first sequence of VLBI images of the quasar 3C 273 made at 22 GHz. They show a linear structure with bright 'knots', and a 'core' at one end, as is typical in core-dominated sources. Oscillations in the ridge line of the jet, which are seen on scales from a few milliarcseconds out to 20 arcsec, do *not* increase on the smallest scale sizes: the 22-GHz structure is well aligned with the jet seen with VLBI at lower frequencies on scales up to 10s of milliarcsec. This contrasts with 3C 345, in which extreme curvature is seen on the smallest scales. Two components are seen to move at superluminal speeds (v/c = 4.4 and 6.0, assuming H_0 = 100 km/s/Mpc). The hybrid maps trace their emergence from the core, and rapid decay on moving out, reaching the detection limit at about 3 milliarcsec. The more-distant moving component from the core is identified with a knot seen on VLBI maps at lower frequencies. A significant amount of flux exists in features larger than 10 milliarcsec which is not seen on our maps.

31.12

High Dynamic Range VLA Observations of Core Dominated Quasars

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High dynamic range observations of the total intensity and linear polarization intensity of eight powerful, core dominated quasars have been made at 5 GHz. These quasars all have one sided jets and six show evidence of diffuse lobes or haloes. The luminosity in the diffuse emission alone is sufficient to for these six to be Fanaroff-Riley class II objects. For all eight quasars the morphology of the jets, in both total intensity and linear polarization intensity, is also consistent with that of FR II objects, except for one ambigous source (0106+013) which displays other characteristics of an FR II source but has a jet with an inferred magnetic field that remains nearly parallel with the jet axis at the terminal hotspot. The observations of these eight quasars are consistent with the idea that compact, core dominated FR II quasars are intrinsically similiar to lobe dominated FR II quasars, but that the core dominated quasars are being observed at small angles to the line of sight.

Large fractional polarizations were observed in the terminal hotspots of the six quasars for which polarization features other than the core were detected. If the terminal hotspots can be approximated as containing highly compressed regions of magnetic field ("Laing sheets") then large fractional polarizations are not to be expected unless the observed properties have been modified by relativistic abberation. If these quasars are oriented within 20° of the line of sight then mildly relativistic hotspot speeds ($\beta > 0.5$) are required to account for the observed fractional polarization.

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31.13

Is the Quasar 3C 232 Embedded in the Neutral Hydrogen Tail of the Galaxy NGC 3067?

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Carilli, van Gorkom, and Stocke have reported detecting neutral hydrogen at the low redshift of, and surrounding, the galaxy NGC 3067. An extension or tail of this gas points towards the higher redshift quasar 3C 232, which is about 2 arcmin away from NGC 3067. If, in spite of their different redshifts, the quasar and NGC 3067 are physically associated, then the quasar would produce a large region of ionized hydrogen in the cloud of neutral hydrogen. We have searched for the H α emission expected from such a region of ionized hydrogen. The observations were obtained with a CCD installed on the Burrell Schmidt telescope. No emission in H-alpha was detected, and upper limits are established. These upper limits are compatible with distances of the order of several kiloparsecs between the quasar and the neutral hydrogen.

31.14

Image Enhancement Techniques Applied to a Search for Gravitational Lenses and Quasar Pairs

N. Weir, S. Djorgovski (Caltech), G. Meylan (STScI)

The detection limit in an optical imaging search for gravitational lenses and quasar pairs is a very steep function of the angular resolution. By using a variety of image processing techniques, one can improve upon the observed resolution ($\sim 1 - 2''$) and search for interesting morphology well beyond the seeing limit (down to $\sim 0.3 - 0.5''$). Here we illustrate the application of two reasonably understood and extensively tested techniques, viz., PSF subtraction and Maximum Entropy Method (MEM) deconvolution, on a set of lens and quasar pair candidates. We find that the two techniques perform in a complementary fashion for the two critical limits of the "superresolution" problem: small seperation of components and a large intensity ratio. MEM, albeit very powerful in separating close components with comparable intensity ratios, is not very good for separating components with very large intensity ratios; it tends to "smooth away" the fainter components. The PSF subtraction technique, on the other hand, can bring out a faint object near a bright one, but it is not very useful in separating close pairs with comparable intensities. The objects in our sample are taken from the survey by Djorgovski and Meylan, and include the binary quasar PKS 1145-071, the multiple system PHL 1222, the quasar QSO 2300-352, and the lens candidate QQ 2345+007. For each, we demonstrate the potential power of these image enhacement techniques for discovering and determining interesting morphological features at limits generally otherwise unattainable. For the particular case of QSO 2300-352, we confirm our resolution enhancement results and the presence of a faint nearby companion $\sim 2.5''$ to the W with high-seeing-quality data, and we present tentative results on our attempt to achieve sub-pixel "resolution" in the case of QQ 2345+007.

31.15

PHL 1222 : a Gravitational Lens or an Interacting Quasar Pair ?

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We are conducting an optical imaging survey for gravitational lenses and quasar pairs, with a spectroscopic follow-up of the most promising candidates (Djorgovski and Meylan 1989, in *Gravitational Lenses*, eds. J.M. Moran *et al.*, (Berlin, Springer), p. 173). The quasar PHL 1222 = UM 144 = QSO 0151+048 is one of the objects selected as potential lens candidates on the basis of two criteria: a large apparent optical luminosity ($M_V \leq -28$), and a relatively large redshift ($z \geq 1.5$). These criteria, chosen to reflect a possible gravitational magnification (luminosity) and to provide a large intercept length (redshift), increase the *a priori* probability that a quasar selected from a magnitude-limited sample is lensed (see Meylan and Djorgovski 1989 *Astrophys. J. Letters* 338 L1 in the case of UM 425).