PHL 1222: a Tentative Estimate of the Total Mass of the System

Under the assumption that the two QSOs are gravitationally bound, and that there is no other massive object in their vicinity, their projected separation and their velocity difference allow us to place a lower limit to the total mass of the system by using the Virial mass equation. At $z = 1.91$, with $H_0 = 75$ km/s/Mpc and $\Omega_0 = 0$, 3.3 arcsec correspond to 28 kpc, whereas with $\Omega_0 = 1$, 3.3 arcsec correspond to 18 kpc. Considering a minimum separation of about 20 Kpc and a minimum velocity $\Delta V = 500$ km s^{-1}, the (minimum) virial mass amounts to about $M_A + M_B \simeq 1.7 \times 10^{11}$ $M_\odot$, a reasonable value for normal galaxies. Allowance for projection effects would suggest a true value of the total mass of the system several times larger than that.

PHL 1222: a Possible Interaction Event

Recent numerical simulations show that gas distributed throughout a galaxy responds strongly to the tidal field of a close companion. In some cases, dynamical instability drives a large fraction of the gas into the inner regions of the galaxy (Hernquist 1989). A strong burst of star formation may follow and subsequent evolution may lead to the formation of a black hole. Continued accretion of gas by the black hole may provide enough power to explain quasars and nuclear activity. From an observational point of view, the "interaction model" seems also to be the dominating paradigm for explaining the origin of nuclear activity in galaxies (cf. Fricke and Kollatschny 1989 for a recent review and further references).

Most interestingly, PHL 1222 was already known to have an absorption system with $z_{abs} > z_{em}$, which almost coincides with the redshift of the fainter component B. This absorption may be a signature of the ambient gas in a probably interacting system. The coincidence between the binary character of PHL 1222 and its $z_{abs} > z_{em}$ absorption system raises an important question: do the other quasars showing $z_{abs} \simeq z_{em}$ also have close neighbours? For example, there is substantial associated Mg II 2799 absorption in component B of the PKS 1145-071 system (Djorgovski et al., in preparation).

Many quasars with $z_{abs} \simeq z_{em}$ have been intensively studied spectroscopically, but not by deep and/or high-resolution imaging (Foltz et al. 1988). It is possible that more interacting systems can be found by imaging quasars with $z_{abs} \simeq z_{em}$. We have already obtained 4 nights at the 3.5-m NTT telescope, which will hopefuly begin to answer this question.

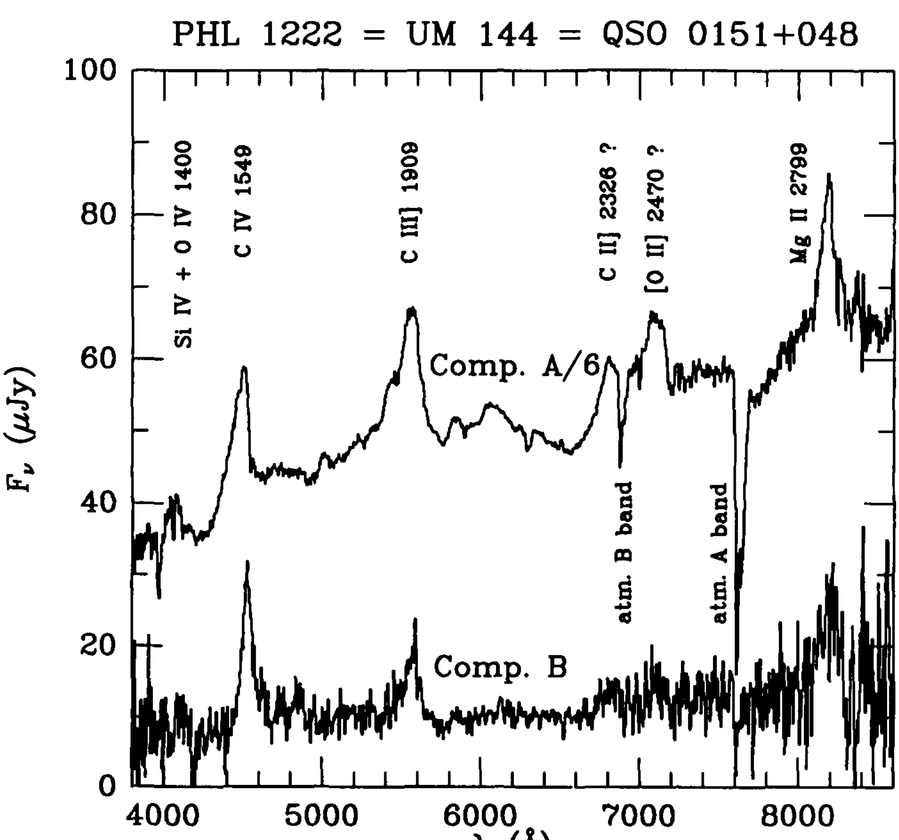

Figure 2: *CCD spectra of components A and B, obtained at ESO, indicating that both objects are quasars. The spectrum of the brighter component A is scaled down by a factor of 6 for easier comparison. The two spectra show some dissimilarities in redshifts, in the shapes of the emission lines (viz., CIV 1549, CIII] 1909, and Mg II 2799) and in the continuum, which favour the interpretation of PHL 1222 as being a physical pair of quasars rather than a gravitational lens.*

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ADDENDUM

Narrow Band Imaging of M87 with the NTT by B. JARVIS, ESO (*The Messenger* 58, 10)

The first reported observation of the H_α + [NII] features in M87 was by Arp (1967) who observed the filamentary feature SE of the nucleus. This was followed by Walker (1968) who discovered a "fan-shaped emission jet" in the light of [OII] Å 3726-29. Ford and Butcher (1979) published ISIT video camera images showing that the H_α + (NII] structure extended to the NE and into the core, van den Bergh (1987) has possibly obtained the deepest images of the filamentary structure in M87 using a CCD but of lower resolution than those obtained in this article.

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