Chandra Observation of UM425 Aldcroft et al.

abstract

We have obtained a 110 ksec ACIS-S exposure of UM425, a pair of QSOs at $z = 1.47$ separated by 6.5, which show remarkably similar emission and broad absorption line (BAL) profiles in the optical/UV. Our 5000 count X-ray spectrum of UM425A (the brighter component) is well-fit with a power law (photon spectral index $\Gamma = 2.0$) partially covered by a hydrogen column of $3.8 \times 10^{22}$ cm$^{-2}$. The underlying power-law slope for this object and for other recent samples of BALQSOs is typical of radio-quiet quasars, lending credence to the hypothesis that BALs exist in every quasar. Assuming the same $\Gamma$ for the much fainter image of UM425B, we detect an obscuring column 5 times larger. We search for evidence of an appropriately large lensing mass in our image and find weak diffuse emission near the quasar pair, with an X-ray flux typical of a group of galaxies at redshift $z \sim 0.6$. From our analysis of archival HST WFPC2 and NICMOS images, we find no evidence for a luminous lensing galaxy, but note a 3-$\sigma$ excess of galaxies in the UM425 field with plausible magnitudes for a $z = 0.6$ galaxy group. However, the associated X-ray emission does not imply sufficient mass to produce the observed image splitting. The lens scenario thus requires a dark (high $M/L$ ratio) lens, or a fortuitous configuration of masses along the line of sight. UM425 may instead be a close binary pair of BALQSOs, which would boost arguments that interactions and mergers increase nuclear activity and outflows.