Size of Quasar Emission-Line Regions

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We present a Hubble Space Telescope (HST) emission-line imaging survey of the seven brightest radio-quiet PG quasars with $z < 0.5$. Images in the [OIII] $\lambda5007$ line were obtained using linear-ramp filters and the Wide Field Planetary Camera 2 with a pixel resolution of 0.0455 to 0.1 arcsec. Two quasars exhibit compact filamentary structure like that seen for Seyferts and may be related to radio outflows. The latter is also reminiscent of the situation in many Seyfert galaxies, where radio outflows are morphologically related to the NLR. All narrow-line regions (NLRs) are very compact with typical extents of 2-4 arcsec. Generally, the structure is relatively symmetric, in agreement with the unified scheme, that predicts a view into the ionization cones of these type 1 objects. The NLR in quasars seems to be consistent with being a scaled-up version of the NLR in Seyferts when including a sample of Seyfert galaxies observed with HST. Most interestingly, the size of the NLR of Seyferts and quasars seems to scale roughly with the square root of the [OIII]. This relationship is comparable to the scaling found for the size of the broad-line region (measured from reverberation mapping) with continuum luminosity. It can been interpreted in terms of a constant photoionization parameter. These data provide the first direct evidence that quasar and Seyfert NLR are related and possibly evolve along a common luminosity-size track determined by photoionization.