Things that Might Interest Friends of Bev Wills

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Take Home Points

1. There is no such things as a typical radio-quiet quasar. If you have ever compared a sample of RL quasars to RQ quasars, you need to do it again more carefully.

2. BH masses estimated from CIV using scaling relations are catastrophically wrong. (Even yours)

3. Hard-Spectrum Quasars are red, BALQSOs are blue.
Spectral Diversity

Elvis et al. (1994) mean SEDs and uncertainties

"...the large dispersion of shapes in individual objects means that the mean SED should be used only with caution, and that the variety of shapes should contain information about the physics of quasars."

There is a mean quasar, but there is no standard quasar.
A Range of Intrinsic SEDs

Differences in the SED underlie the differences in the emission AND absorption properties of quasars.

Leighly et al. 2007
Distinguishing Red from Dusty

SMC non-BAL
- Black: typical powerlaw in bin
- Red: modal powerlaw
- Colors: amount of reddening
- Dashed: fit based on photometry
- The fits based on the photometry track the spectra well
Emission Lines as f(color)

UV line differences due to SED.

Optical due to host galaxy, BH mass, and/or inclination.
BALQSOs are BLUE

They are very UV luminous quasars.
Mean BALQSOs as a function of UV color.

Krawczyk et al. 2014 (in prep); see also Baskin, Laor, & Hamann (2013)
Predicting Radio-Loud Quasars

We all know that the Radio Loud fraction is \(~10\%)\, but there is no way to predict whether an *individual* quasar will be radio loud based on its optical/UV properties.

What we *can* do is restrict the parameter space where RL quasars are found.
RLF as $f(L,z)$

$N = 55,302$
$N_{\text{bin}} = 244$
RLF as $f(\text{CIV})$

CIV acts as an EV1 surrogate at high-z; see also Sulentic et al.; Wills et al. & collaborators

Kratzer & Richards 2014
Generally speaking radio-loud quasars and BALQSOs live in opposite corners. RLs do not occupy a unique parameter space.
Radio-loud quasars are drawn from the “hard-spectrum” population of RQs. In fact they are indistinguishable.

BALQSOs are drawn from the “soft-spectrum” population of RQs (with a larger than 20% covering fraction).

Shouldn’t compare RL to RQ, but rather RL to HSRQ to SSRQ.
RLF as $f(\text{Mass})$

CIV masses wrong by $\sim 1$ dex

You can test your corrections with this analysis.

Kratzer & Richards 2014
Conclusions

1. There is no typical RQ quasar with which to compare RL.

2. CIV BH masses are wrong.

3. HSRQs are red.

4. SSRQs (BALQSOs) are blue.