

# Studying a Comparison Sample for a Selection of Low-Redshift FeLoBALs

...

Julianna Voelker, Cora DeFrancesco  
Advisor: Dr. Karen Leighly



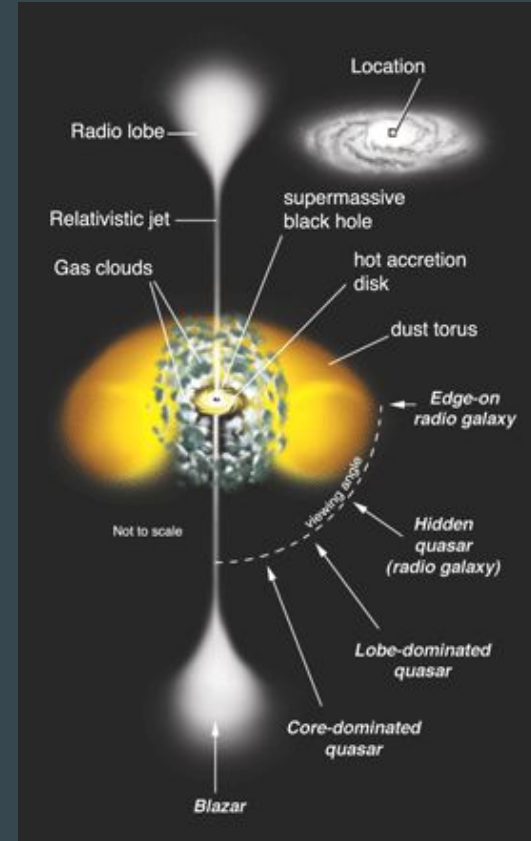
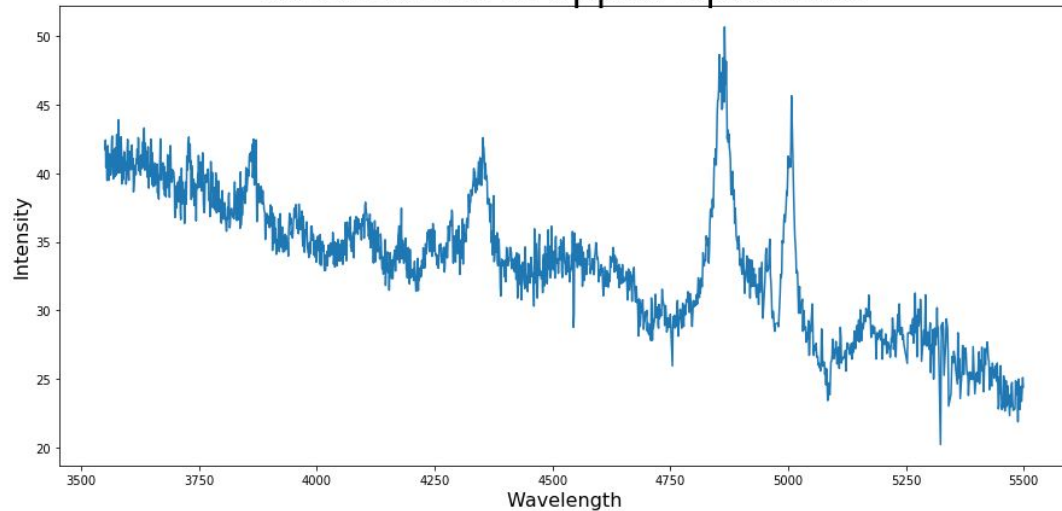
*The* UNIVERSITY *of* OKLAHOMA

# Introduction

- ❑ Quasar: luminous active galactic nucleus (AGN)
- ❑ Quasar spectra: show emission and absorption lines
- ❑ FeLoBAL quasars

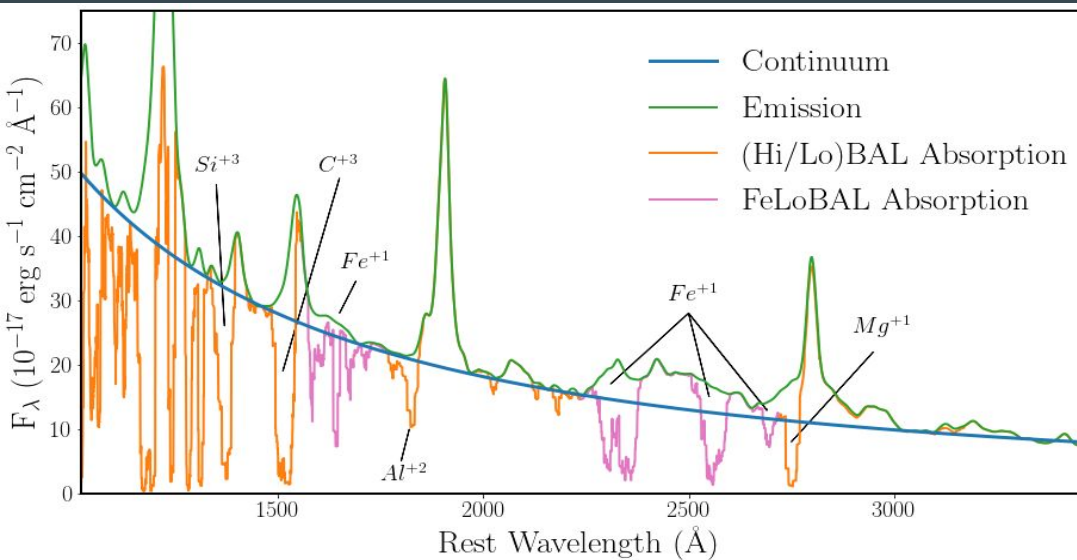
Source: G. Schilling, Science **292**, 1985 (2001).

sdss130111 Cropped Spectrum

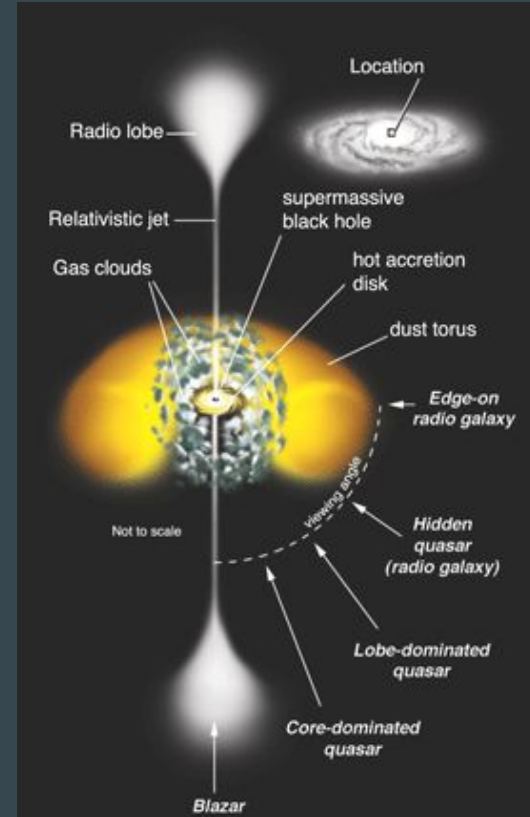


# Introduction

- ❑ Quasar: luminous active galactic nucleus (AGN)
- ❑ Quasar spectra: show emission and absorption lines
- ❑ FeLoBAL quasars



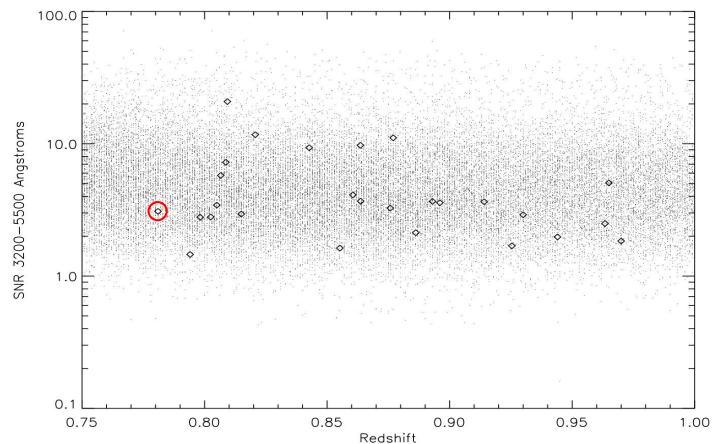
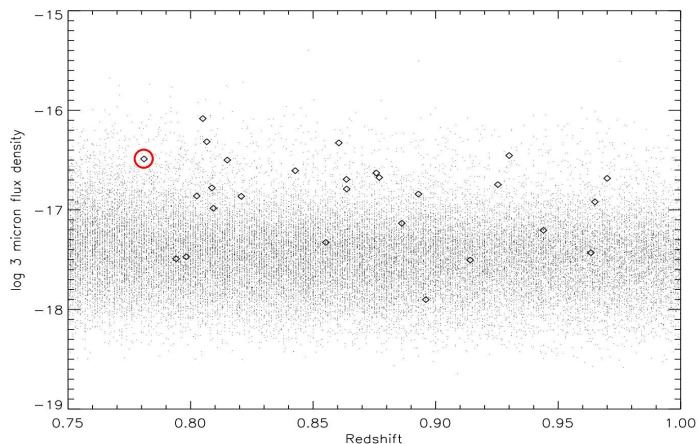
Source: G. Schilling, Science **292**, 1985 (2001).



Source: Collin Dabbieri, presented at AAS meeting, 2020 (unpublished).

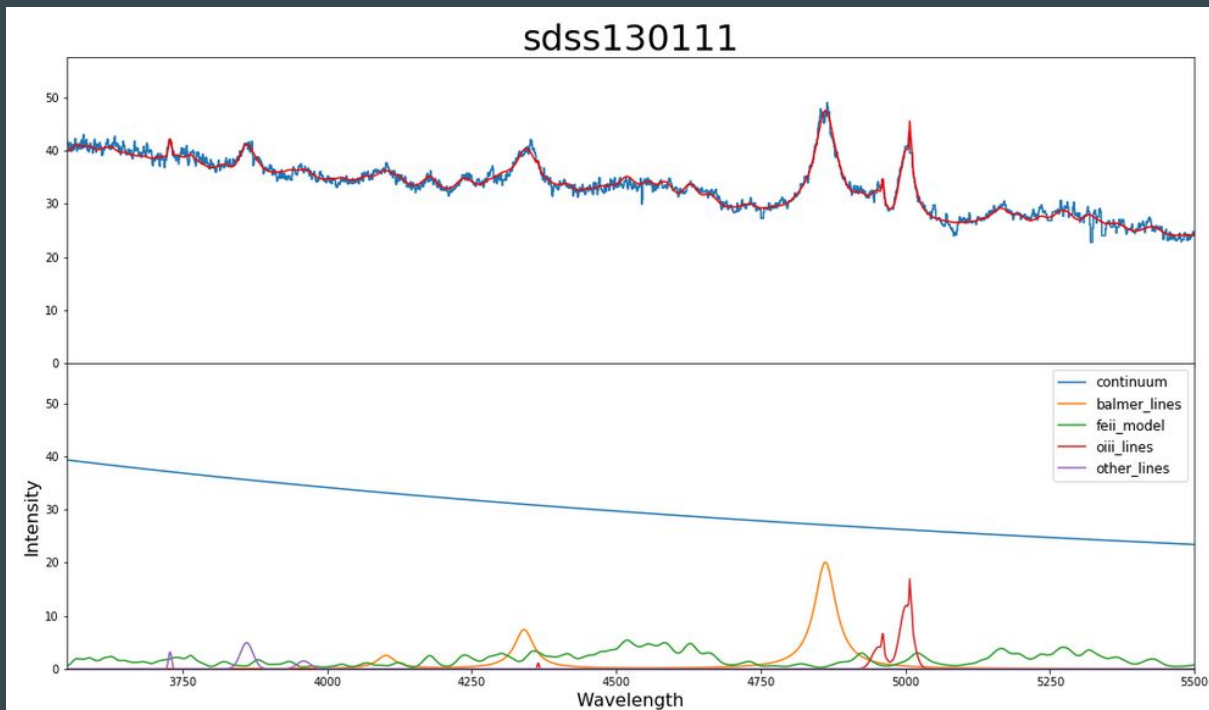
# Sample Selection

- ❑ Compare our sample to an original sample of FeLoBALs
- ❑ Chose equivalent quasars to 18 intermediate luminosity quasars from original sample
  - ❑ 5 new quasars per each of the original 18 = 88 total in the new sample
- ❑ Goal: determine why both strong FeII and strong OIII are present in original sample



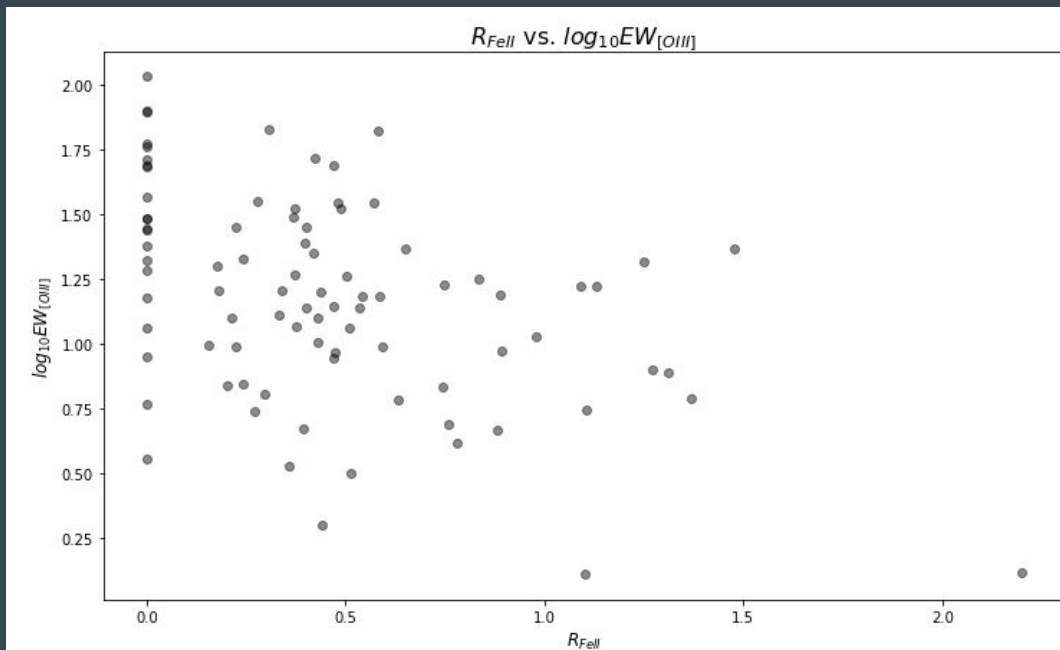
# Analyzing Spectra

- ❑ Use python and Jupyter notebooks
- ❑ Create a model for the spectrum
  - ❑ Continuum
  - ❑ Balmer lines
  - ❑ OIII lines
  - ❑ FeII lines
  - ❑ Other lines

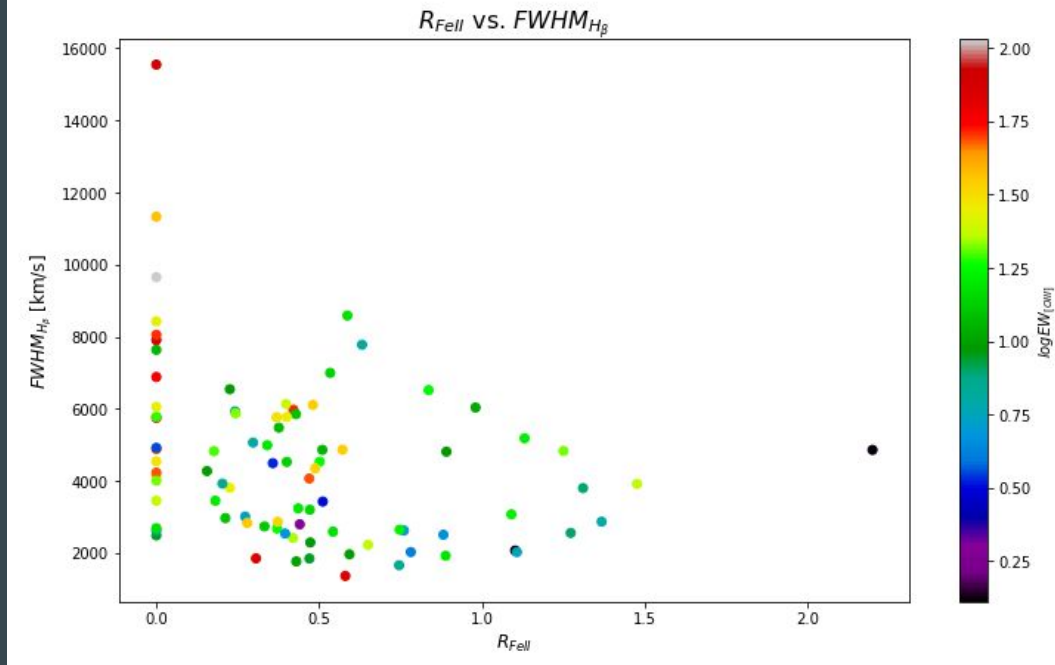
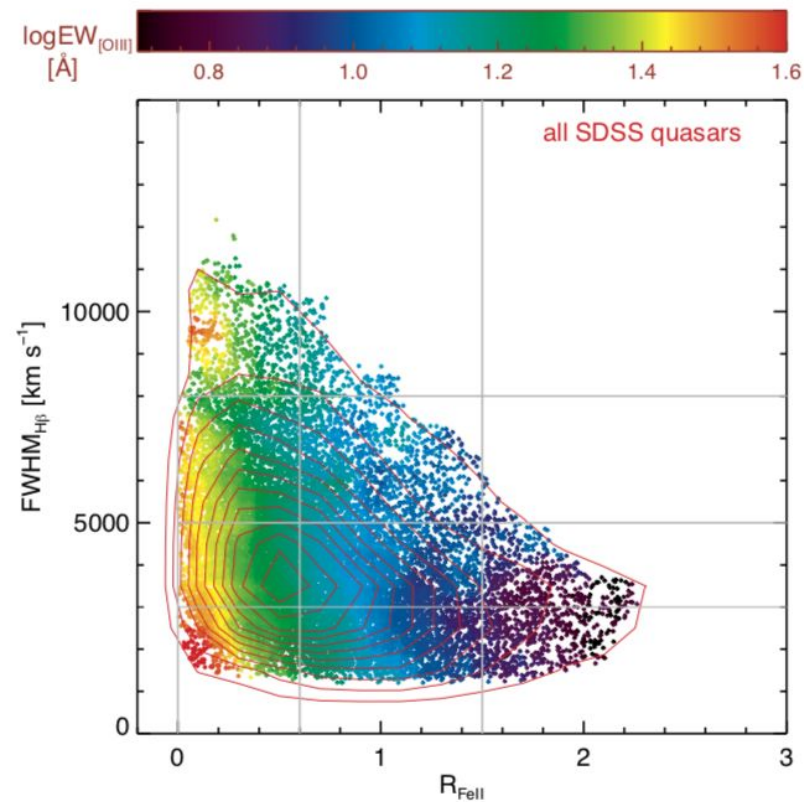


# Results

- ❑ 76.1% of the spectra had both strong FeII and strong OIII
- ❑ 23.9% of the spectra had strong OIII but no iron
- ❑ Spearman's rank correlation coefficient between OIII equivalent width and RFeII:  $r = -0.20638764$



# Results



Source: Y. Shen and L.C. Ho, Nature **513**, 210 (2014).

# Results

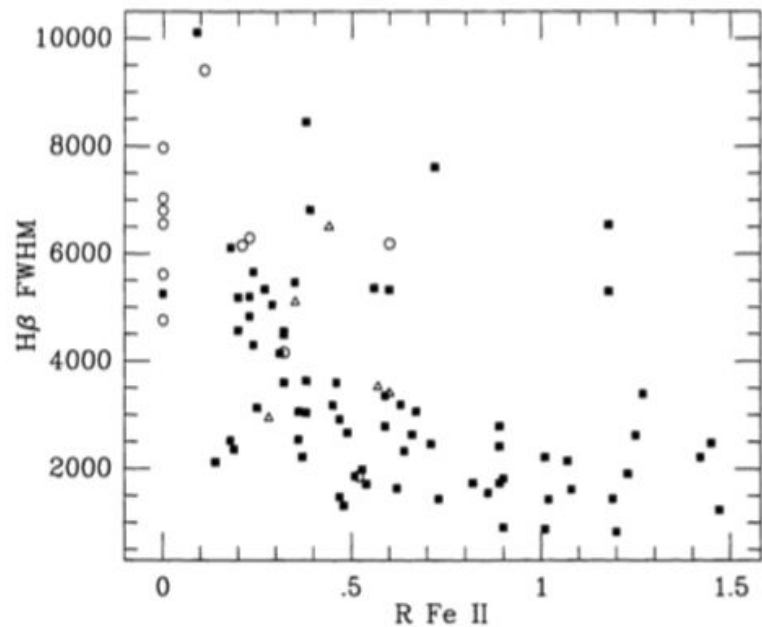
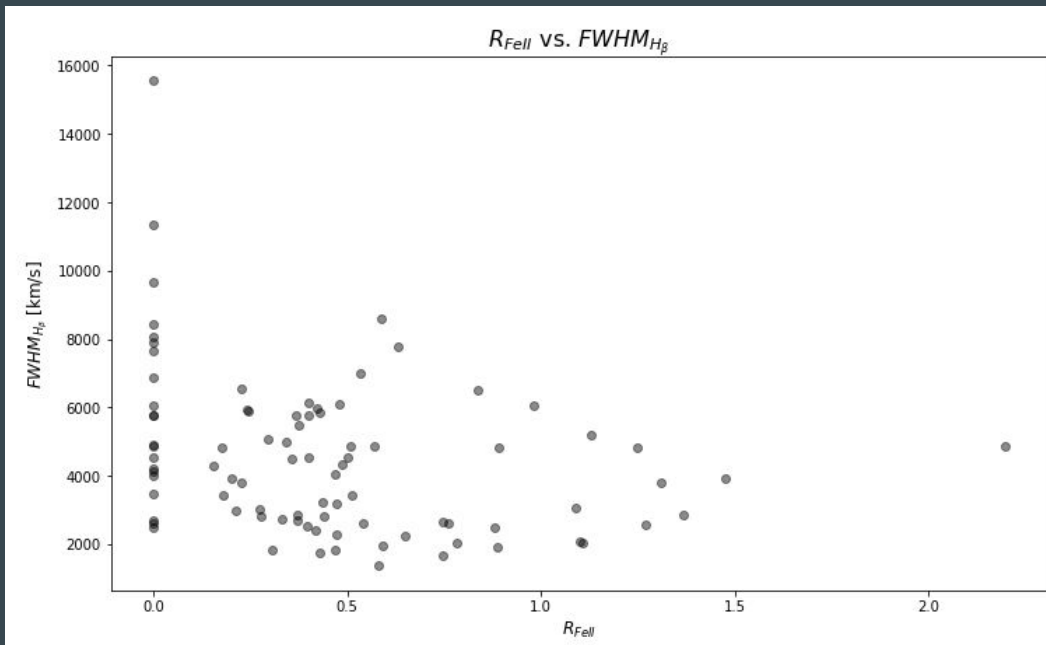


FIG. 9.—FWHM of the H $\beta$  line plotted against  $R_{Fe II}$ , the ratio of the equivalent width of the Fe II complex between  $\lambda 4434$  and  $\lambda 4684$  to that of H $\beta$ .



Source: T.A. Boroson and R.F. Green, The Astrophysical Journal Supplement Series **80**, 109 (1992).



# The future: working with SimBAL and FeLoBALs

- Use SimBAL to analyze a sample of higher redshift FeLoBALs
  - $2.1 < z < 2.6$
  - Compare with lower redshift objects currently being analyzed
  - Differs from previous sample: absorption lines

