



Variability of AGN Spectral Properties

Part I: Intrinsic Baldwin Effect

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I will not talk about!

In biology, the "Baldwin effect" is the result of the interaction of evolution with learning by individual animals over their lifetime. It turns out that individual learning tends to enhance evolutionary learning at the species level. The effect is named after J. Mark Baldwin, an American naturalist who described it in 1896.



JAMES MARK BALDWIN

Or about...

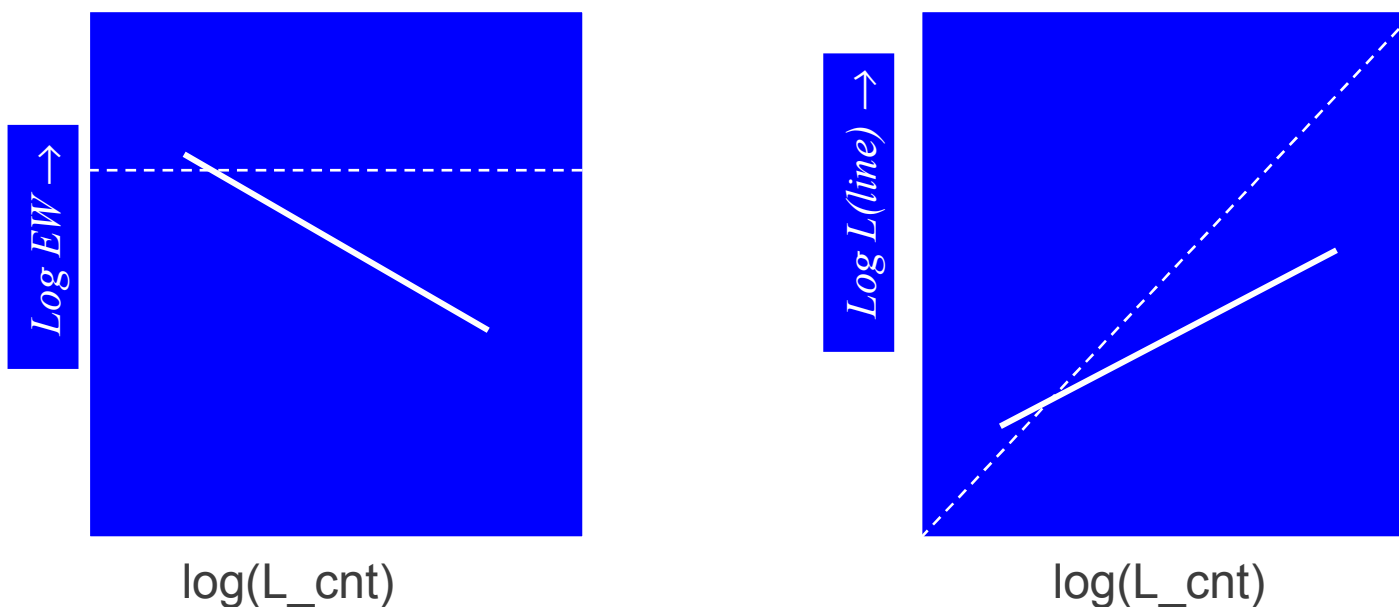


Alec Baldwin

I will talk about...

Ensemble (“global”): single-epoch observations of multiple QSOs

Intrinsic: multi-epoch observations of a single, variable AGN



- Jack A. Baldwin 1977 showed strong correlation between EW and $L(1450\text{\AA})$
- Carswell and Smith 1978 referred that as Baldwin effect.
- Pogge and Peterson in 1992 dubbed "intrinsic" Baldwin effect for individual variable AGNS

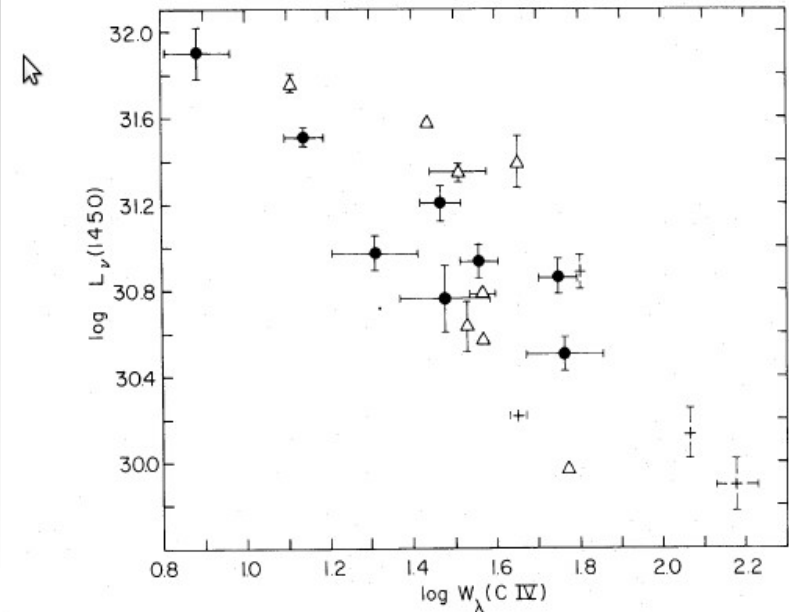


FIG. 2.—The relationship between the computed continuum luminosity at 1450 Å and the equivalent width of C iv $\lambda 1550$ in the rest frame. The symbols have the same meaning as in Fig. 1.

- Its shown for almost all the lines in UV/optical
- Progress is going on also in X-ray in last couple of years
- Kinney et al. (1990) intrinsic Beff has a steeper slope than global
- M.R. Goad, K.T. Korista and C. Knigge in 2004 reported non constant slope of the Intrinsic Baldwin Effect for Hbeta line NGC5548

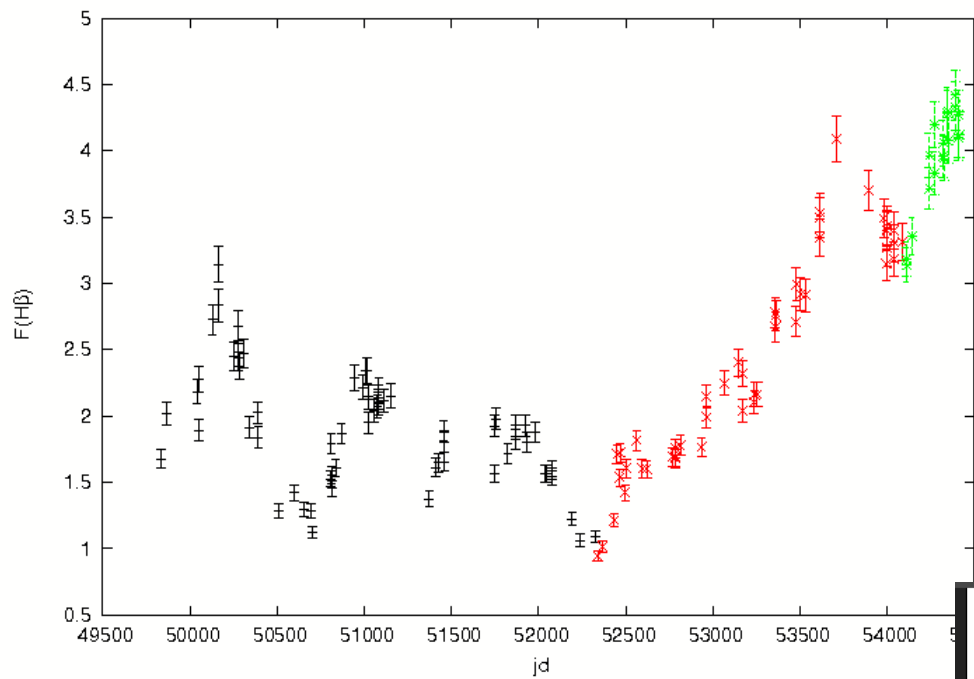
What I did

- Found all possible datasets for objects
 - NGC 4151
 - NGC 5548
 - 3C390.3

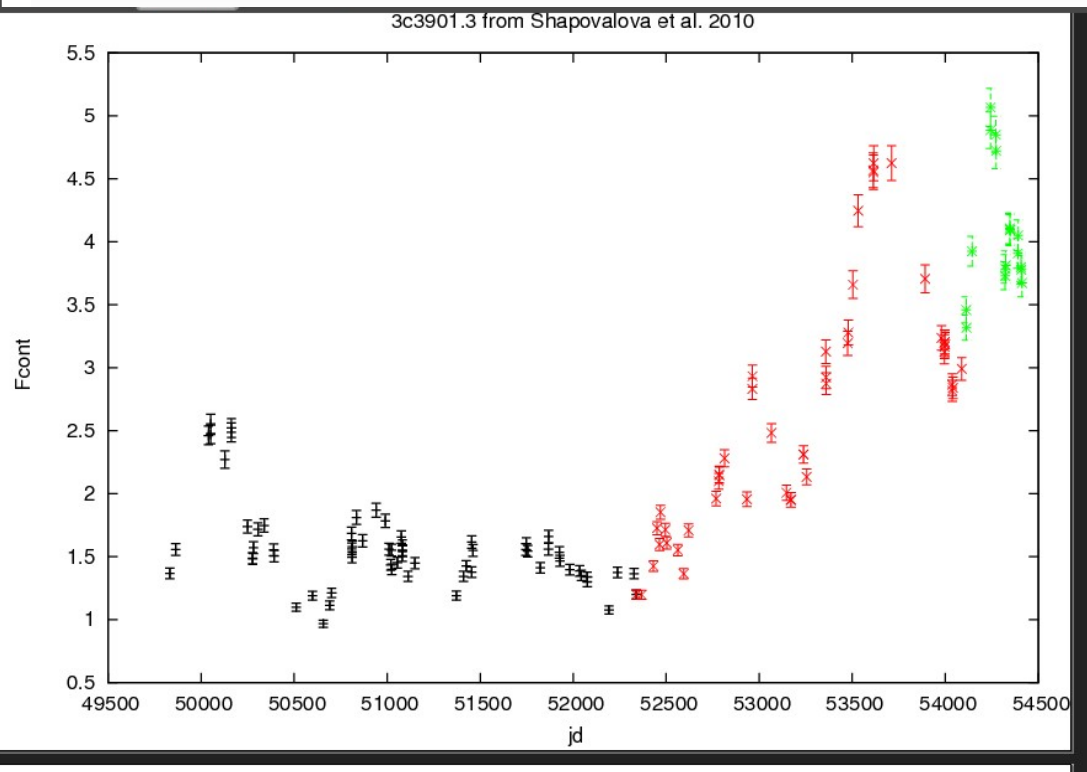
And I played with them to see if there is a Baldwin effect

RESULTS

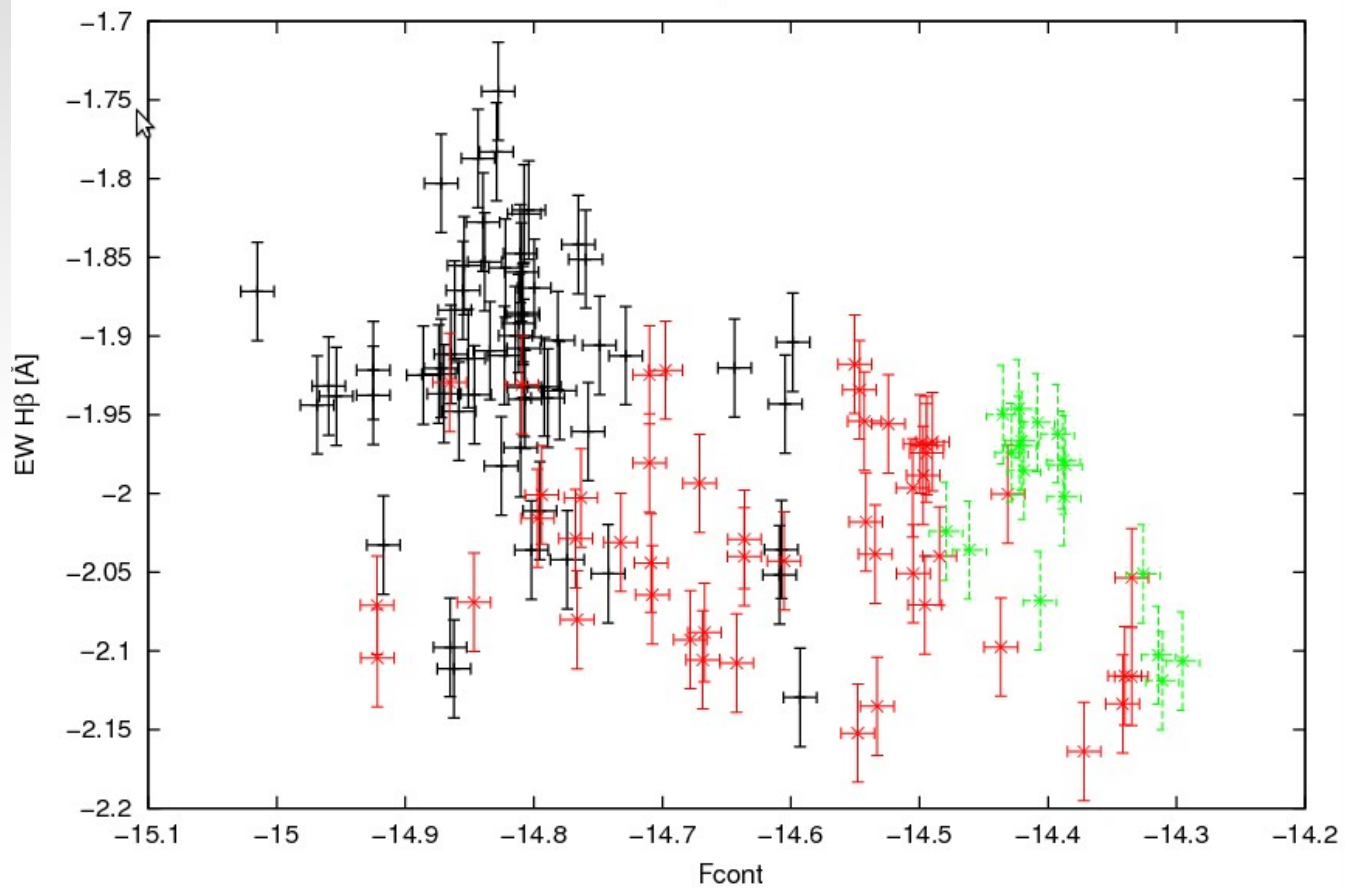
3c3901.3 from Shapovalova et al. 2010



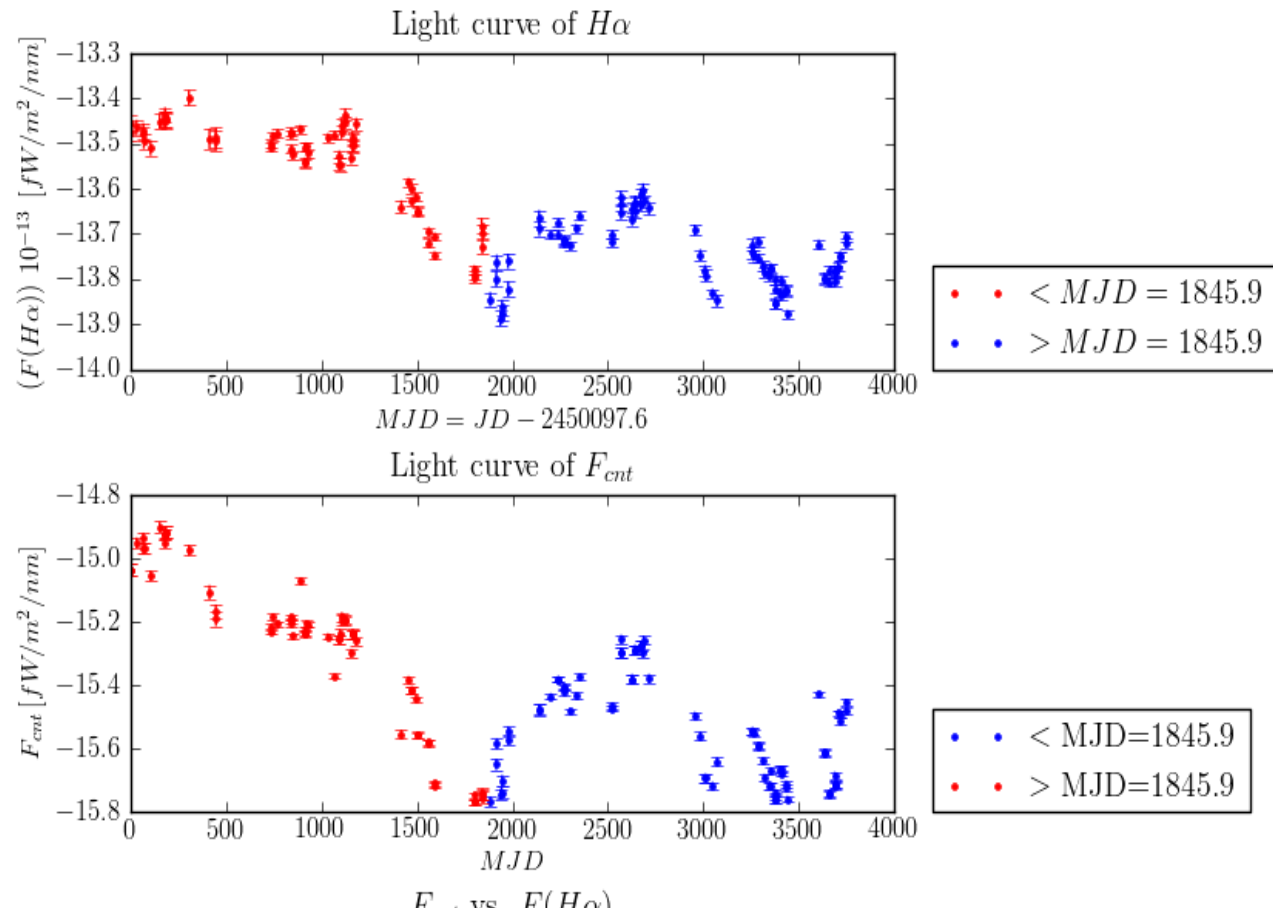
3c3901.3 from Shapovalova et al. 2010



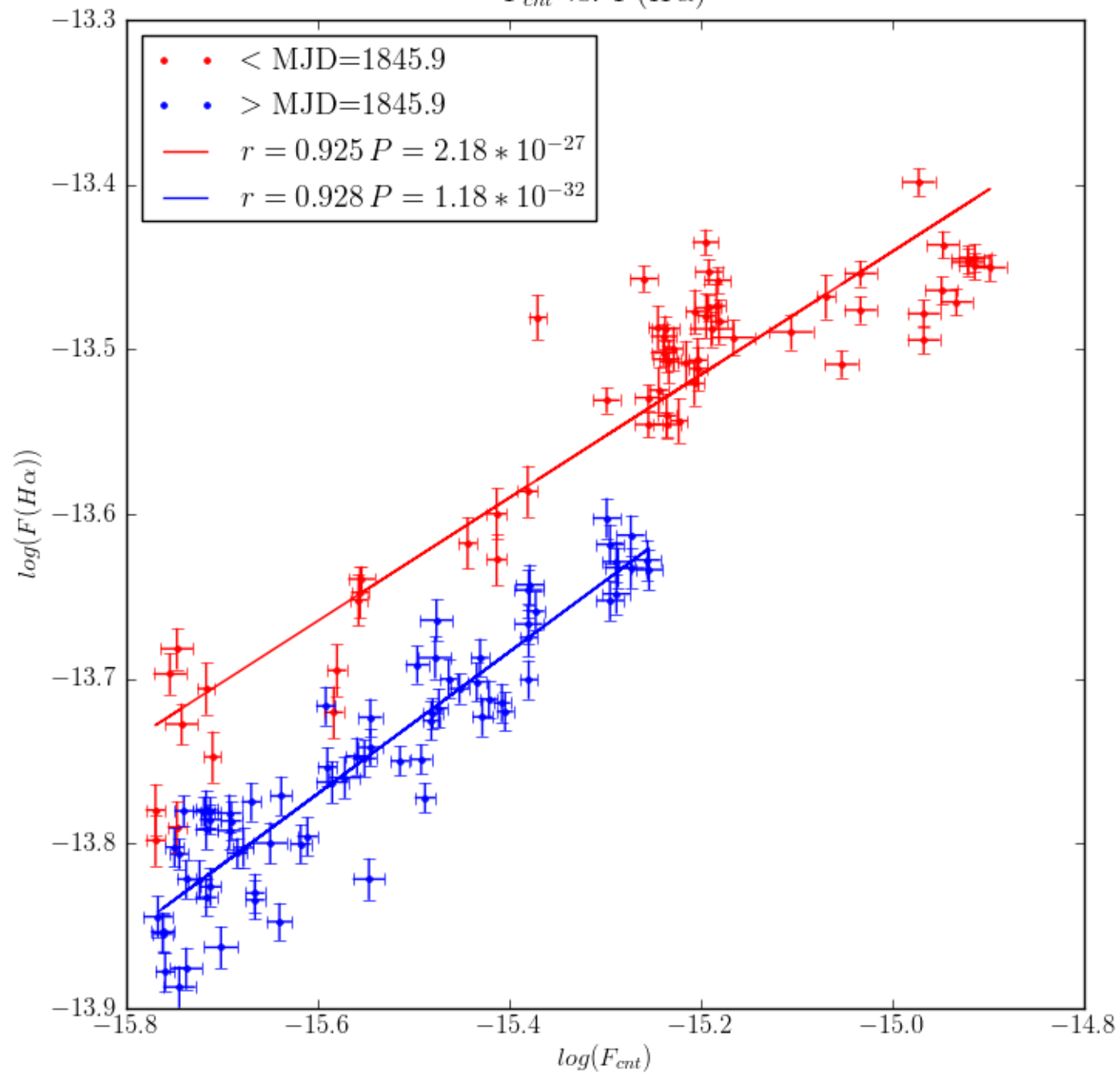
3c3901.3 from Shapovalova et al. 2010



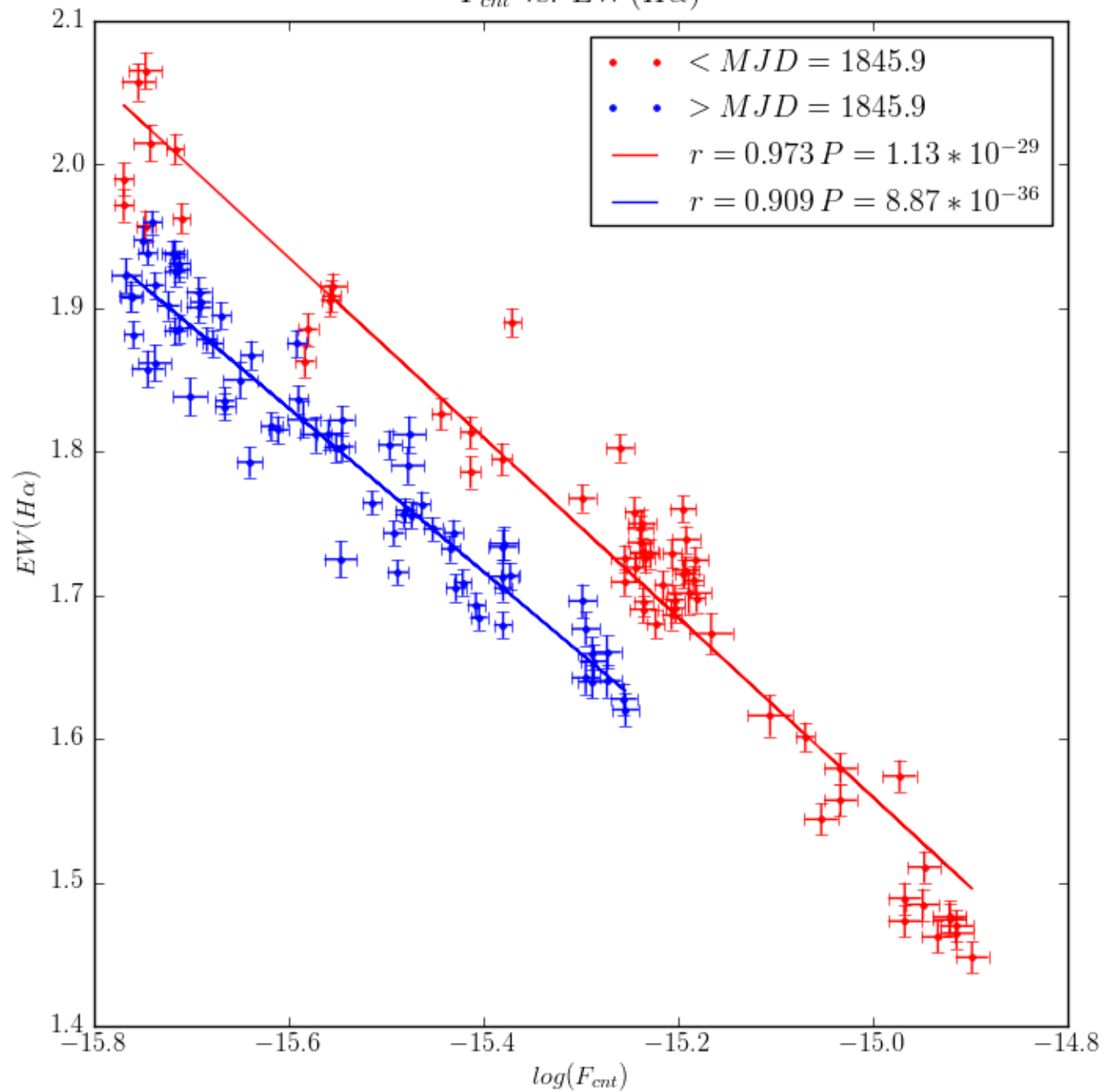
NGC 4151

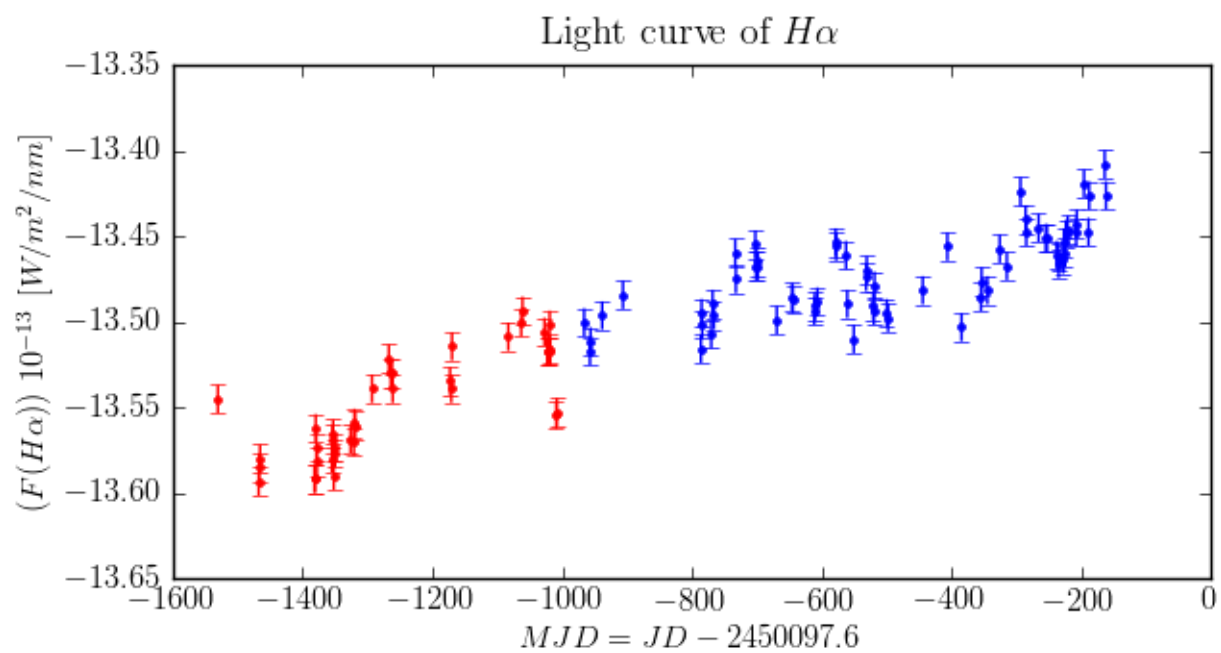
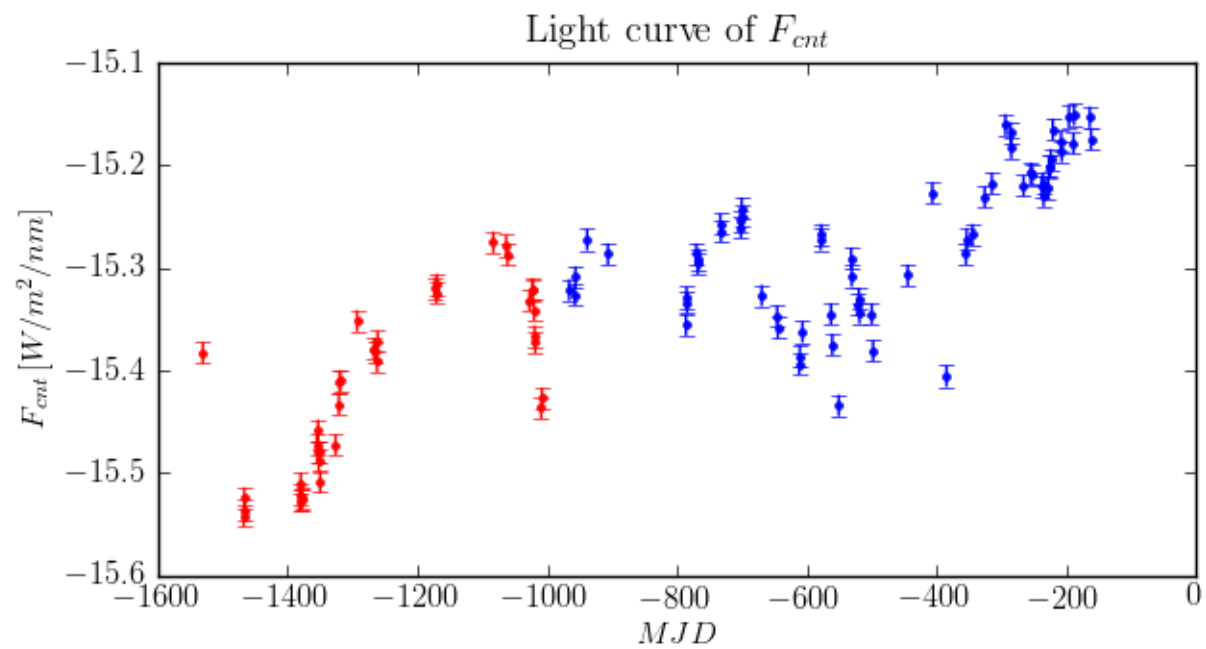


F_{cnt} vs. $F(H\alpha)$

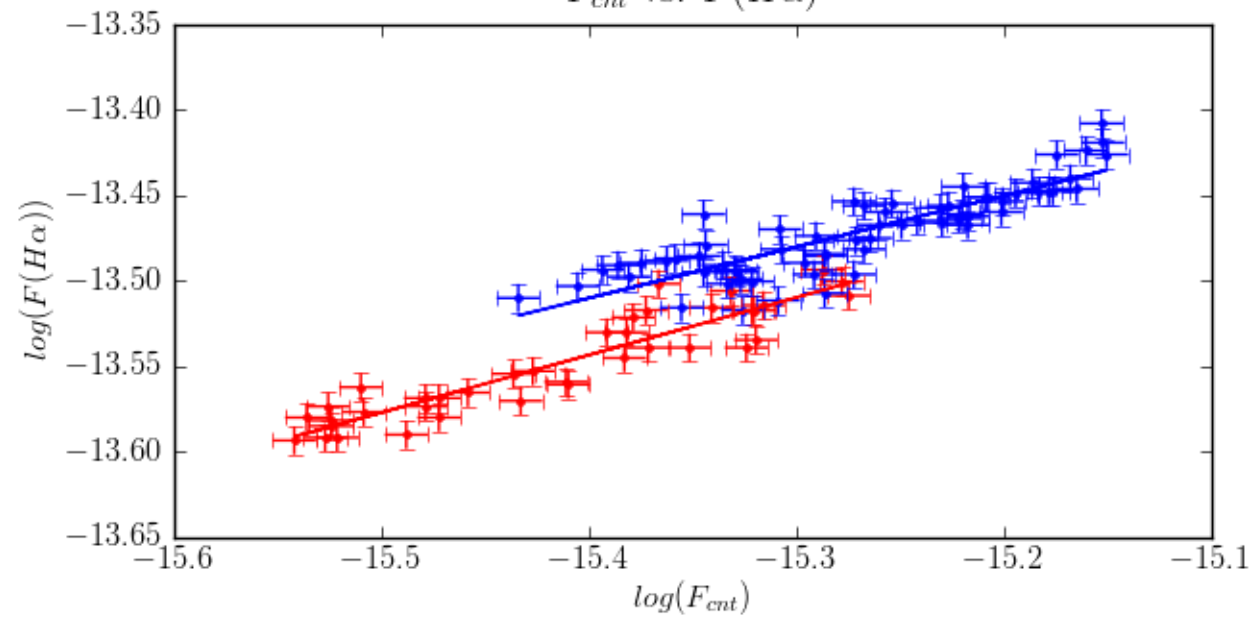


F_{cnt} vs. $EW(H\alpha)$

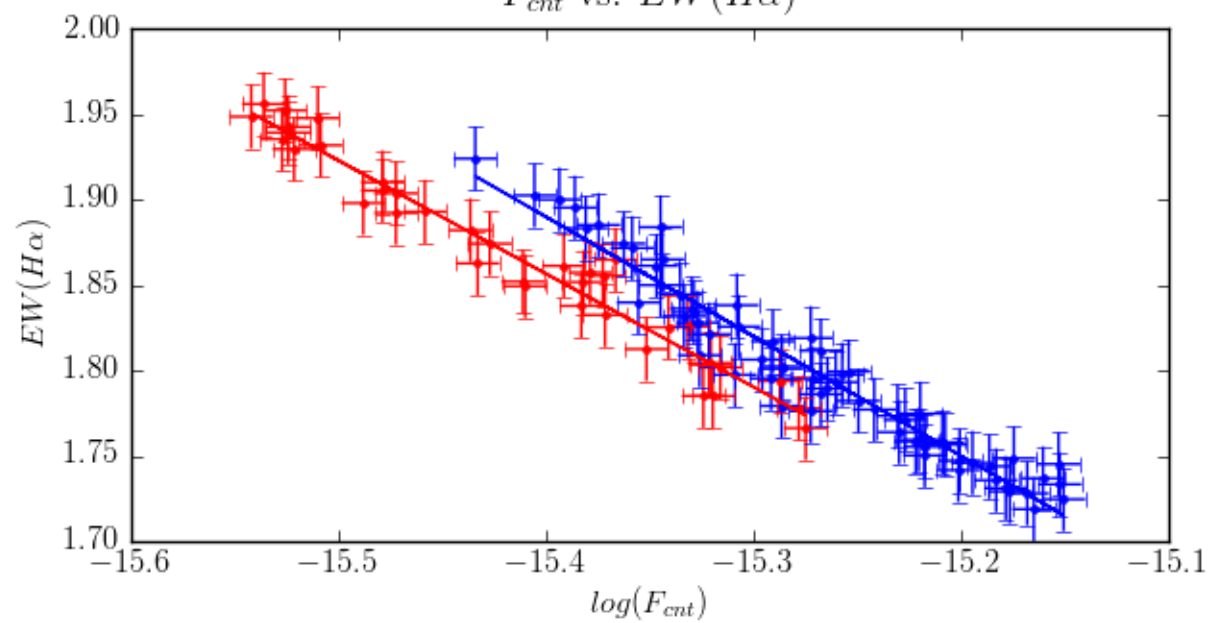




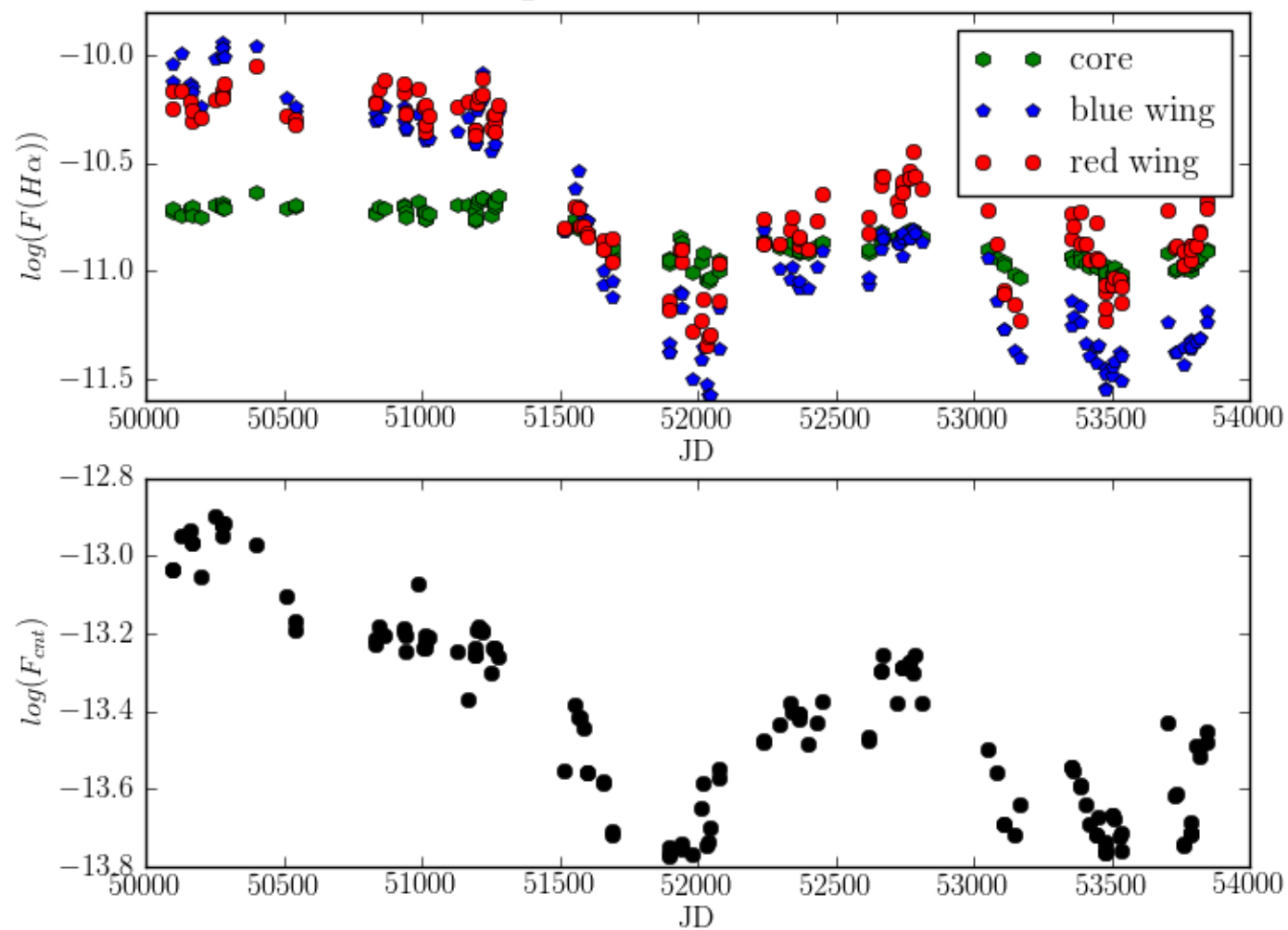
F_{cnt} vs. $F(H\alpha)$



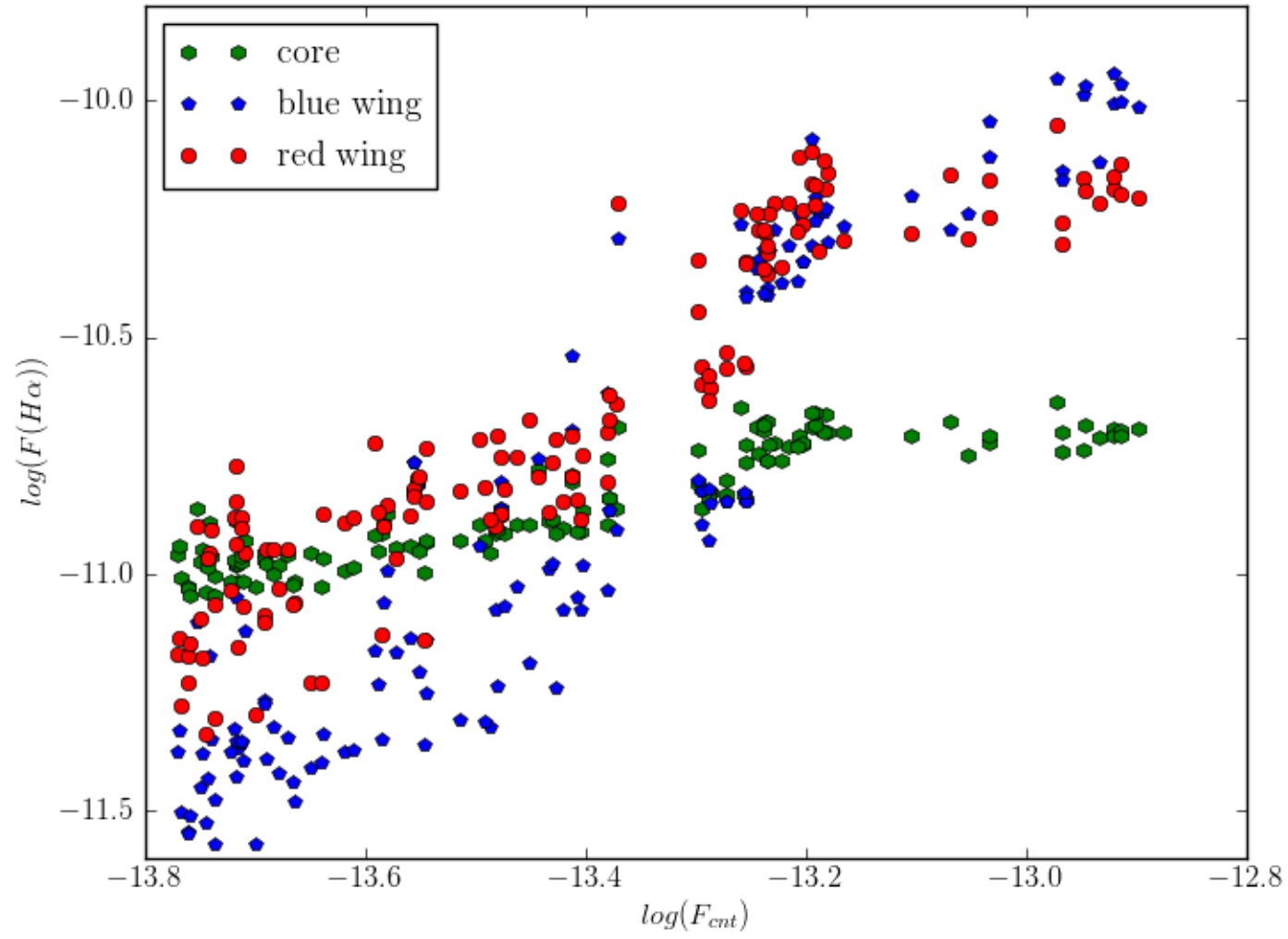
F_{cnt} vs. $EW(H\alpha)$



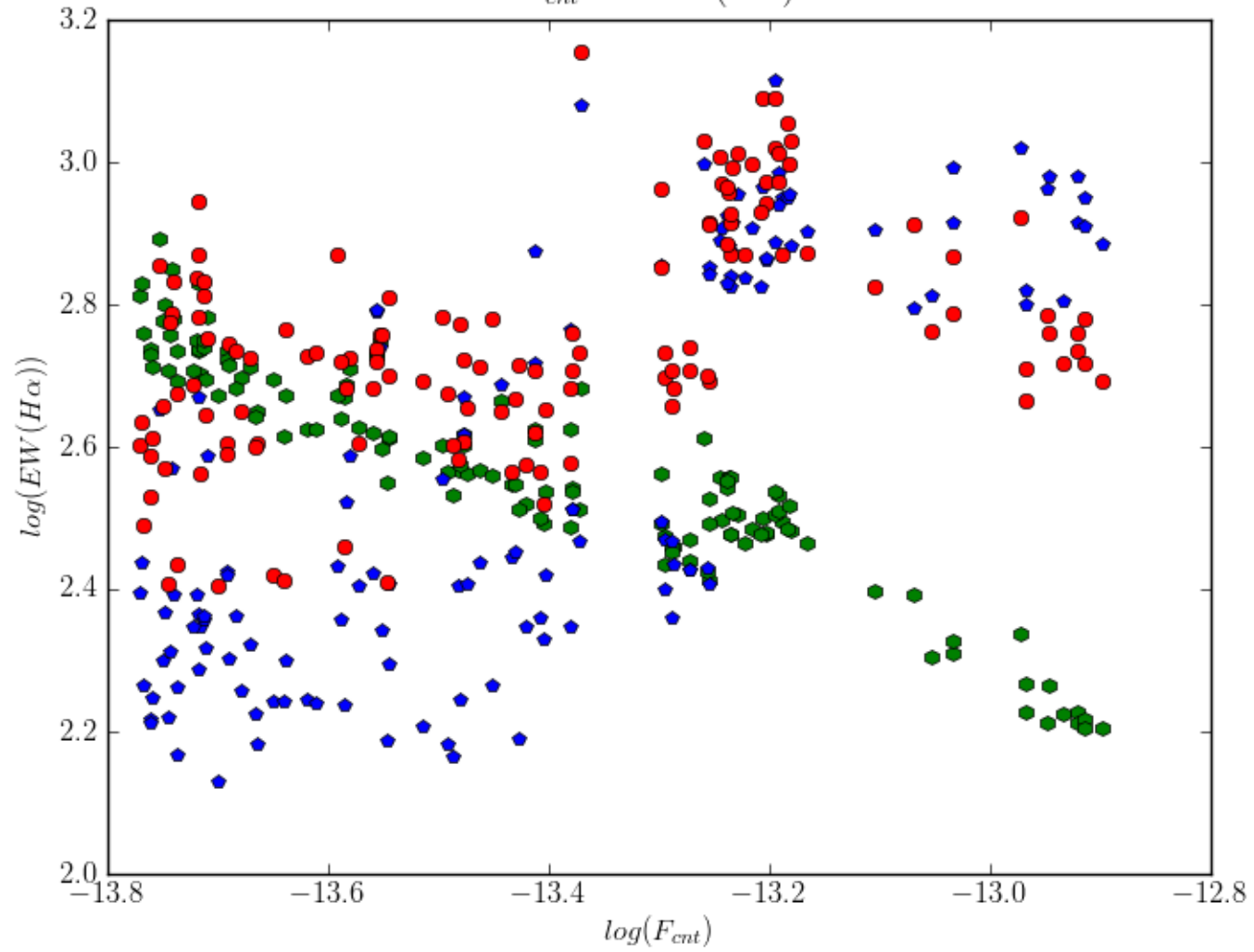
Light curve of $H\alpha$ and F_{cnt}



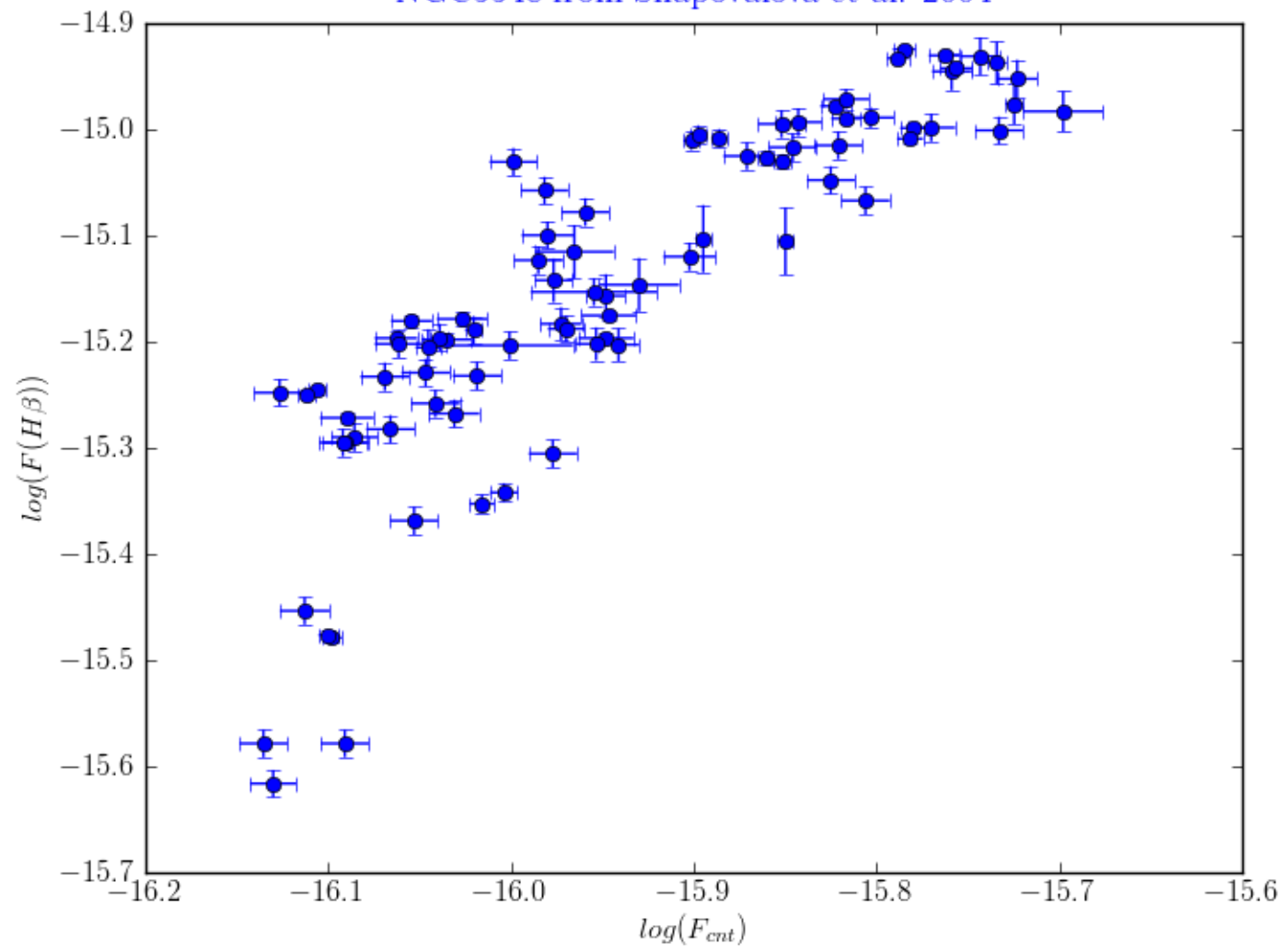
F_{cnt} vs. $F(H\alpha)$



F_{cnt} vs. $EW(H\alpha)$



NGC5548 from Shapovalova et al. 2004



Final remarks

- Intrinsic Baldwin effect was clearly shown on NGC 4151
- There is periodicity (changes in structures in BLR or change of accretion rate governs that?)
- Further investigation on low continuum flux stages

The End