SPECTRAL ANALYSIS OF AGNS

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27 April, 2012

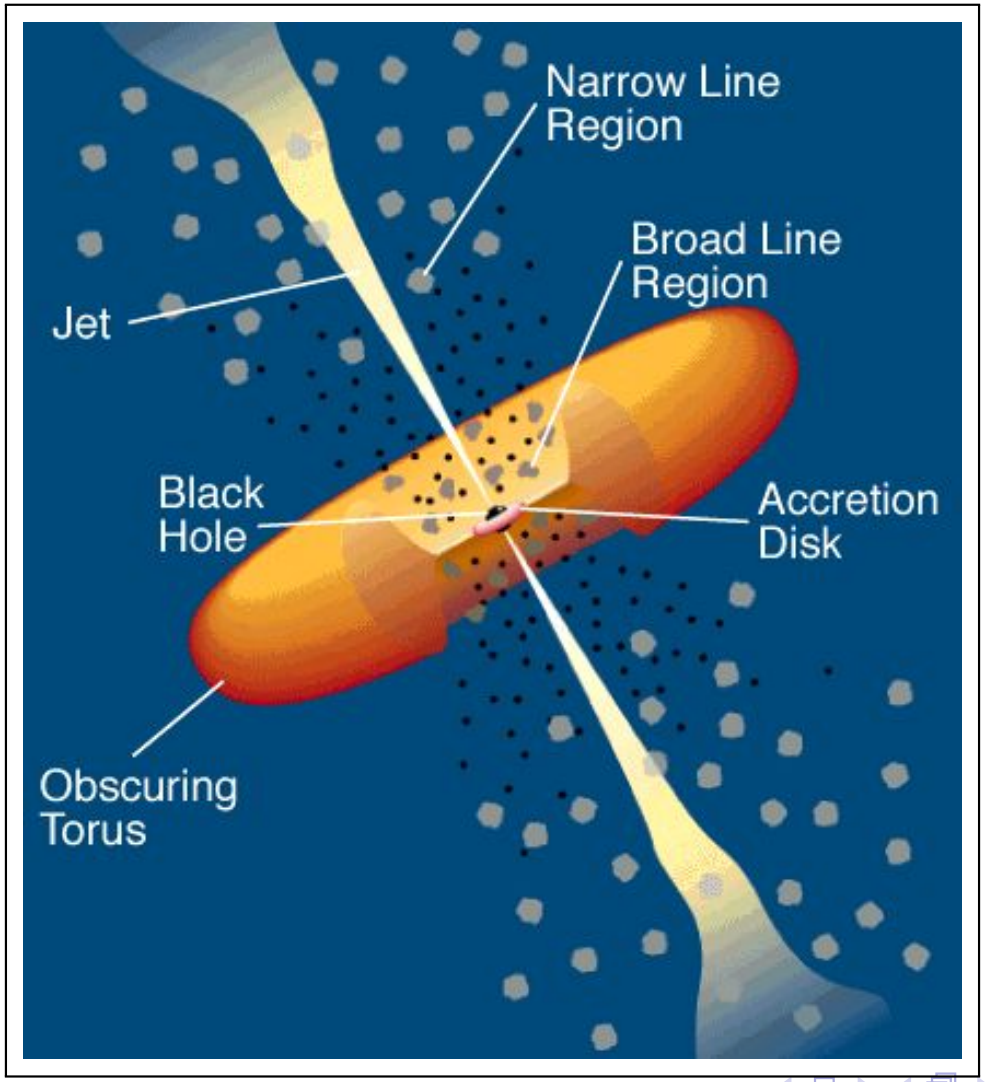
Framework

1. Introduction
2. The Sample and Analysis
3. Progress till now
4. Plan for the future

Framework

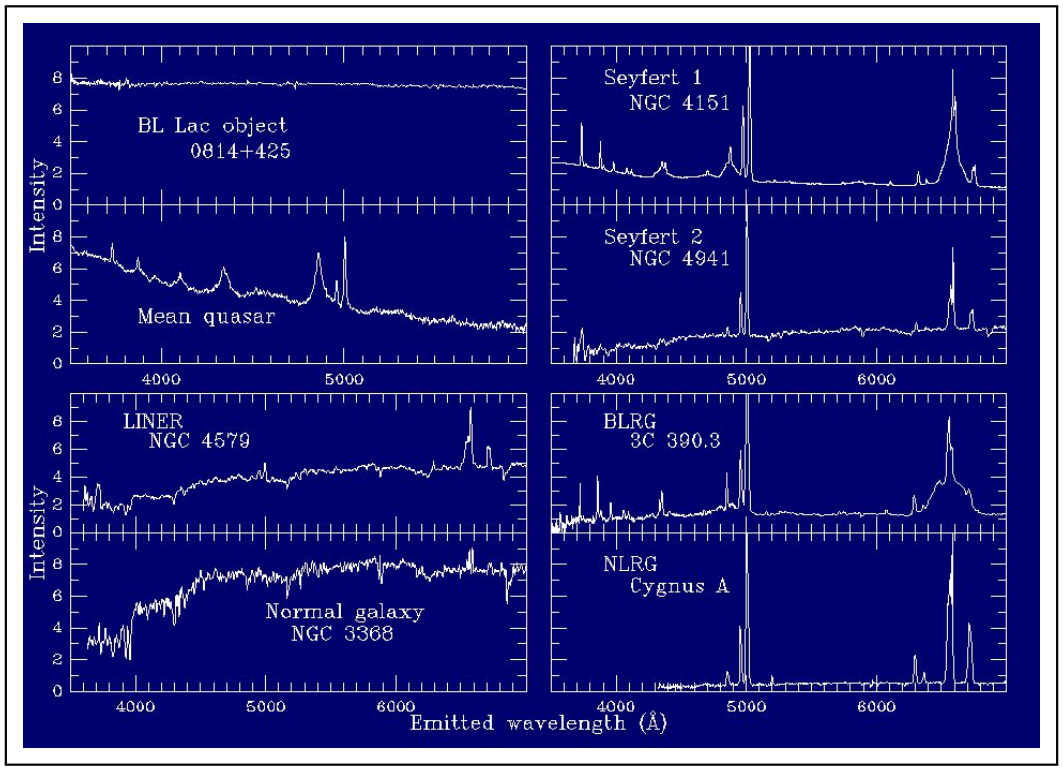
Introduction

Active Galactic Nuclei are one of the most interesting and energetic sources in the universe.



Introduction

With our current observing advancements, we have detected many AGNs but due to their complex and diverse nature, they are yet not clearly understood. One of the ways to study their complex structure is by analyzing their spectra.



Introduction

- Spectral properties $\longrightarrow$ physical conditions, geometry and the state of the regions emitting different spectral lines.
- Correlating and analyzing the spectral properties $\longrightarrow$ physical background of these emission regions.
- Many authors have investigated the AGN structure by using correlation method (e.g. Boroson Green 1992; Wills et al.1999; Croom et al. 2002; Grupe 2004; Wang et al. 2006, 2009; Kovacevic et al. 2010 etc).
- Lot of promising correlations like Baldwin Effect and others have been confirmed but the physical cause behind them is yet to be understood.

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The Sample and Analysis

Sample Selection

From SDSS (Sloan Digital Sky Survey) Data Release 7, we have chosen Quasars with some specific properties -

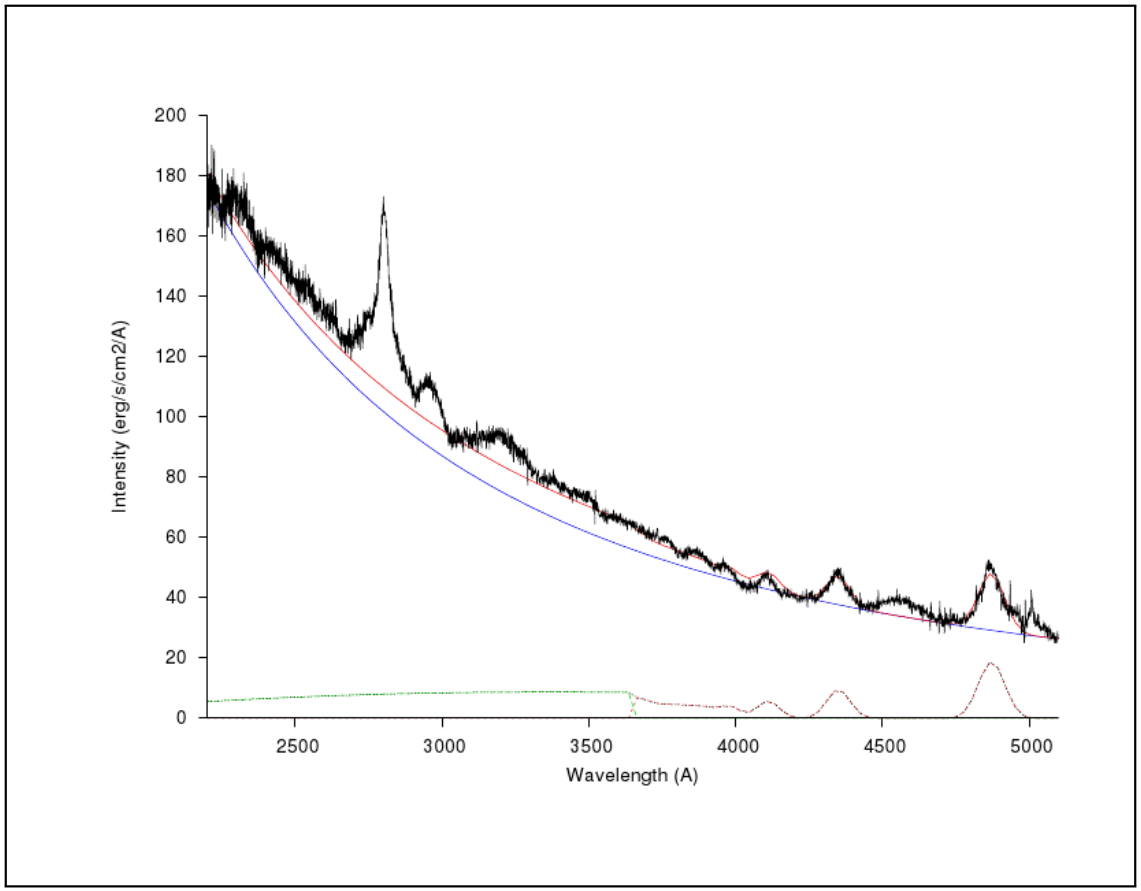
1. High Signal to Noise Ratio (S/N $>$ 25)
2. Redshift Range of 0.4 to 0.6 so as to have Balmer Series and optical iron lines in Spectral Range
3. High Redshift Confidence (confidence $>$ 0.95)
4. H_β and M_g as emission lines

Sample Spectra

We get **333 SDSS Quasar Spectra** with these Requirements.
Of these 333 spectra, we found **83 spectra** to be having negligible stellar contribution.

The Sample and Analysis

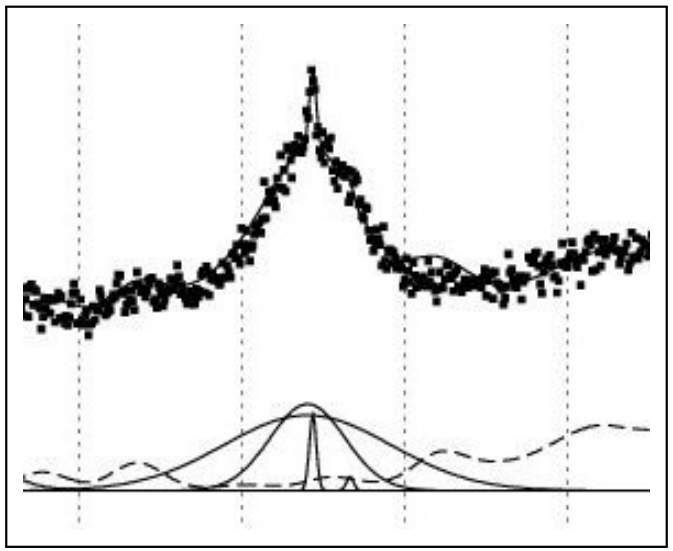
Using IRAF and DIPSO, we de-redshift all the spectra, correct them for galactic extinction and subtract the continuum



The Sample and Analysis

Finally we fit the spectra by decomposing them to account for contributions from different AGN regions -

- Narrow Line Region - NLR
- BLR coming from two emission regions (Popovic et al. 2004, Bon et al. 2006,2009, Brotherton et al. 1994 etc)
  1. Intermediate Line Region - ILR
  2. Very Broad Line Region - VBLR

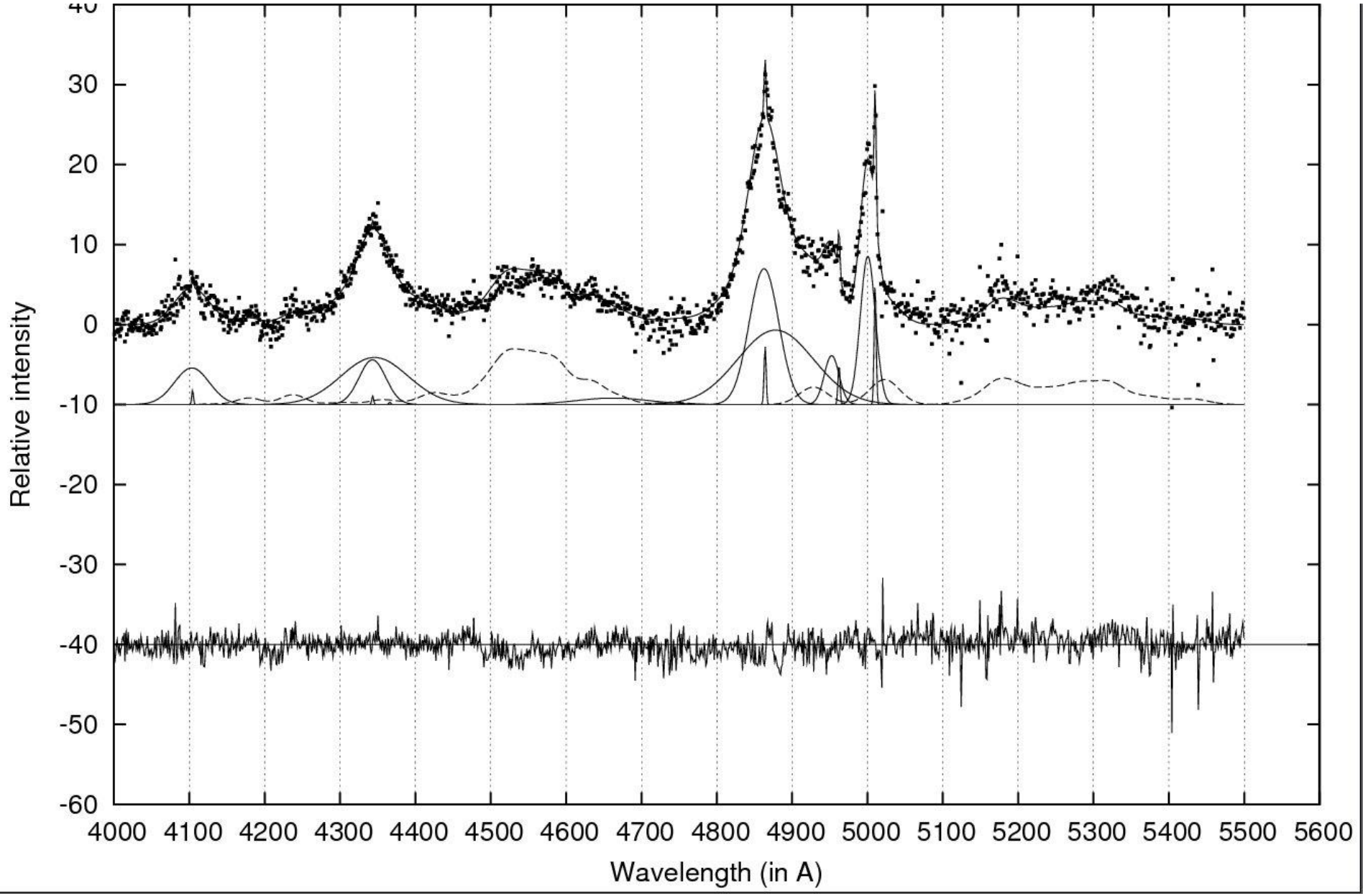


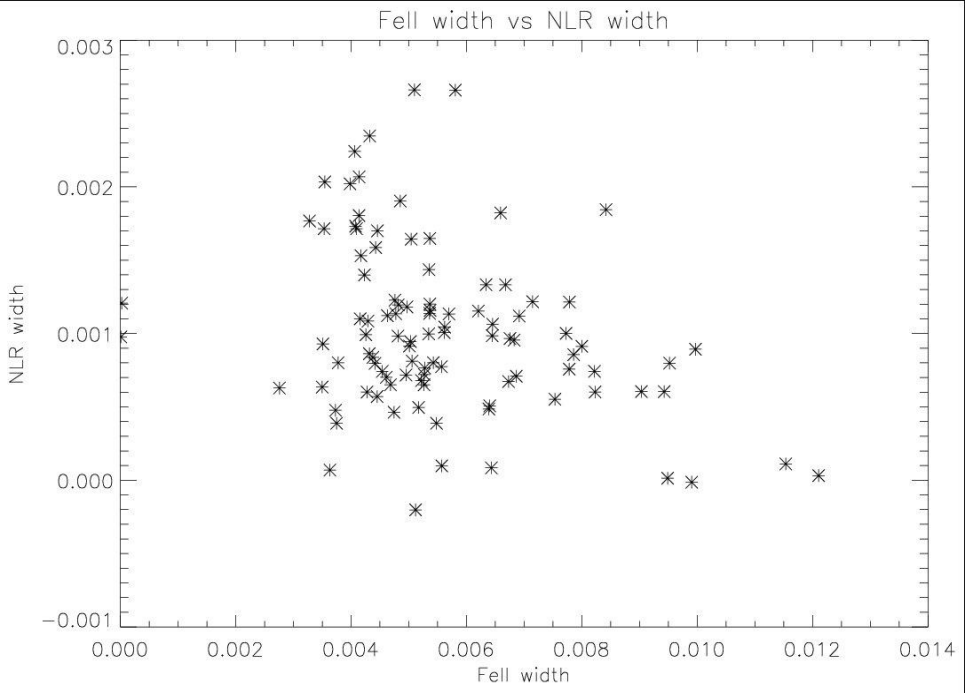
Framework

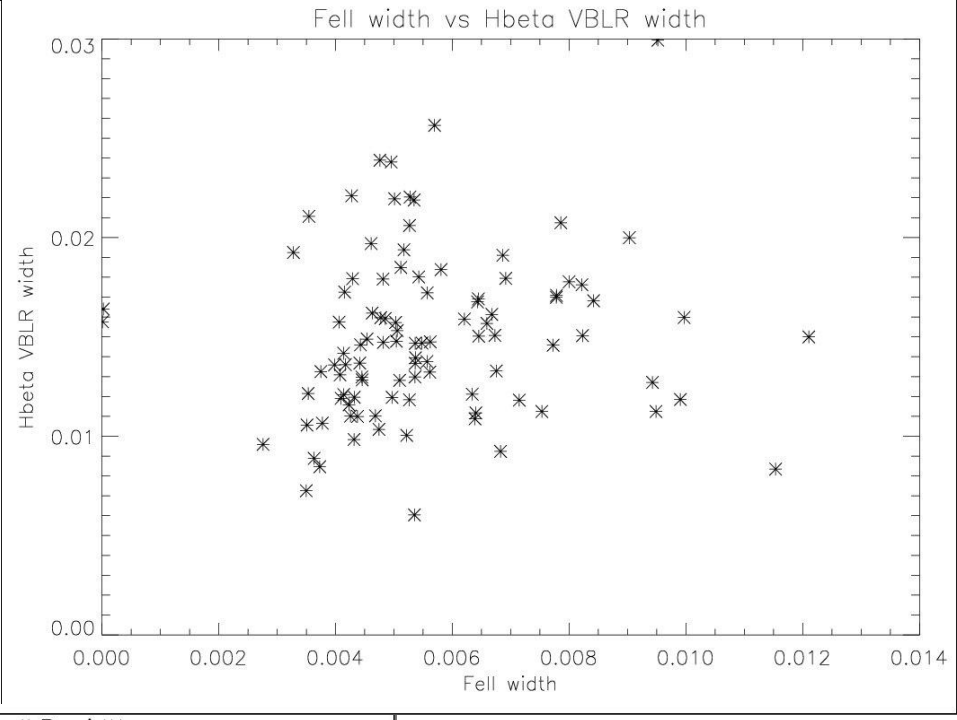
Progress till now

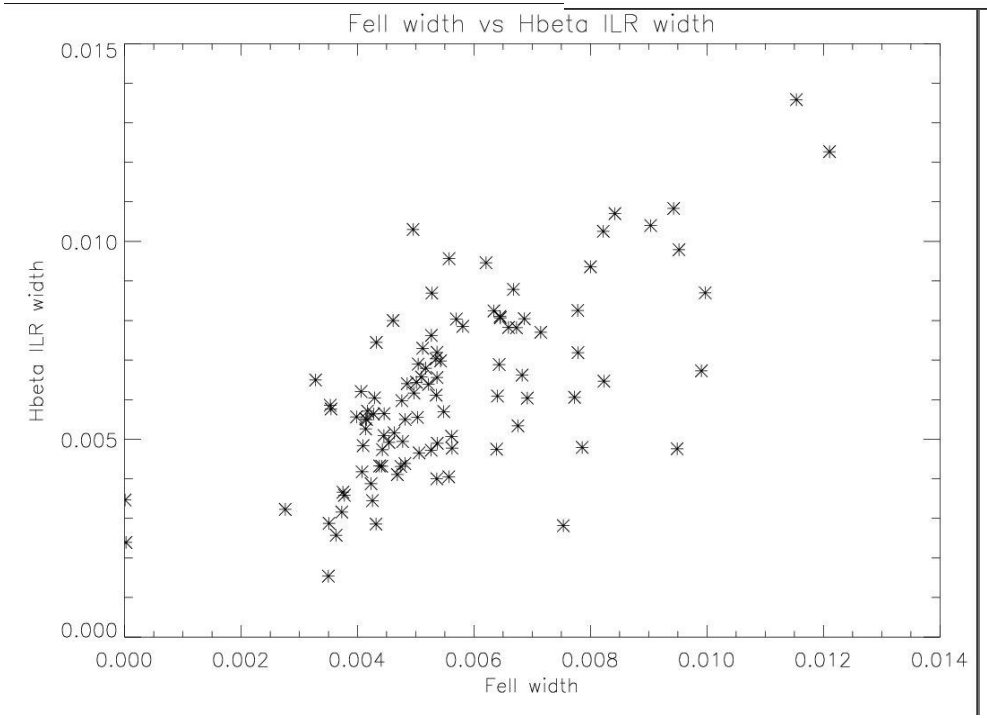
- We have downloaded our sample of 333 spectra and have started working with the 83 spectra with negligible stellar contribution plus 17 normal ones - making it a group of 100 spectra.
- We have fitted them for the optical range of the spectra ($4000\dot{A} - 5500\dot{A}$).
- All parameters were extracted and few correlations were tried.

Fitting of Spectra



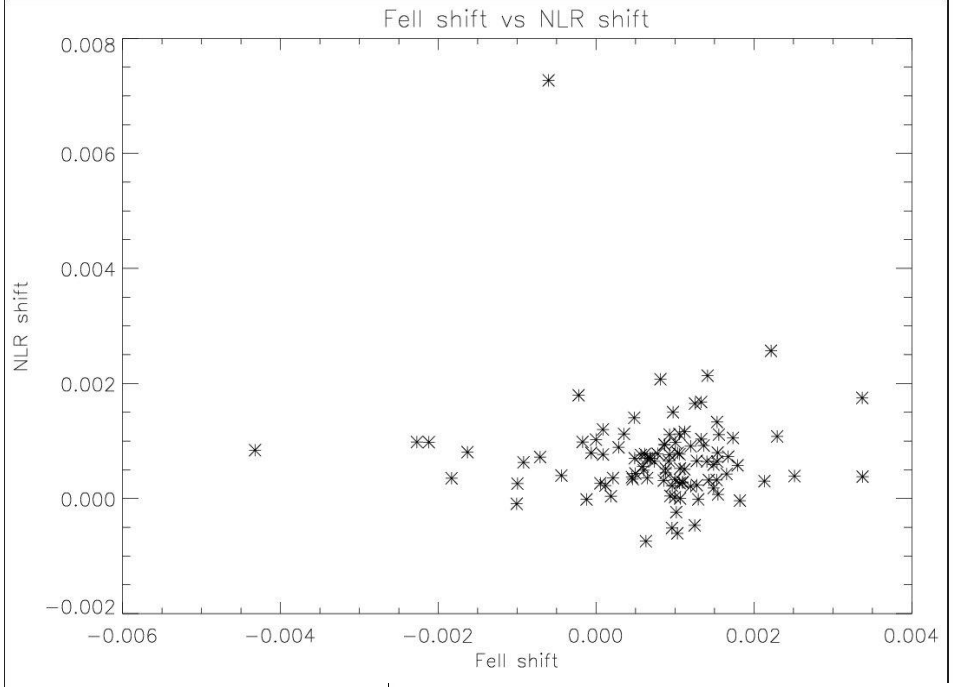


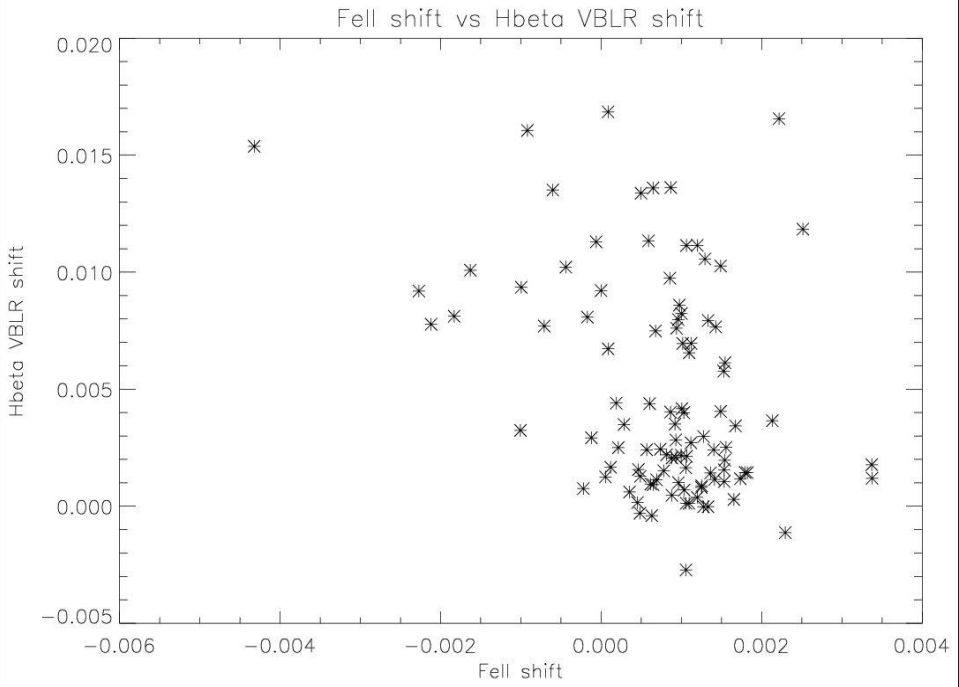


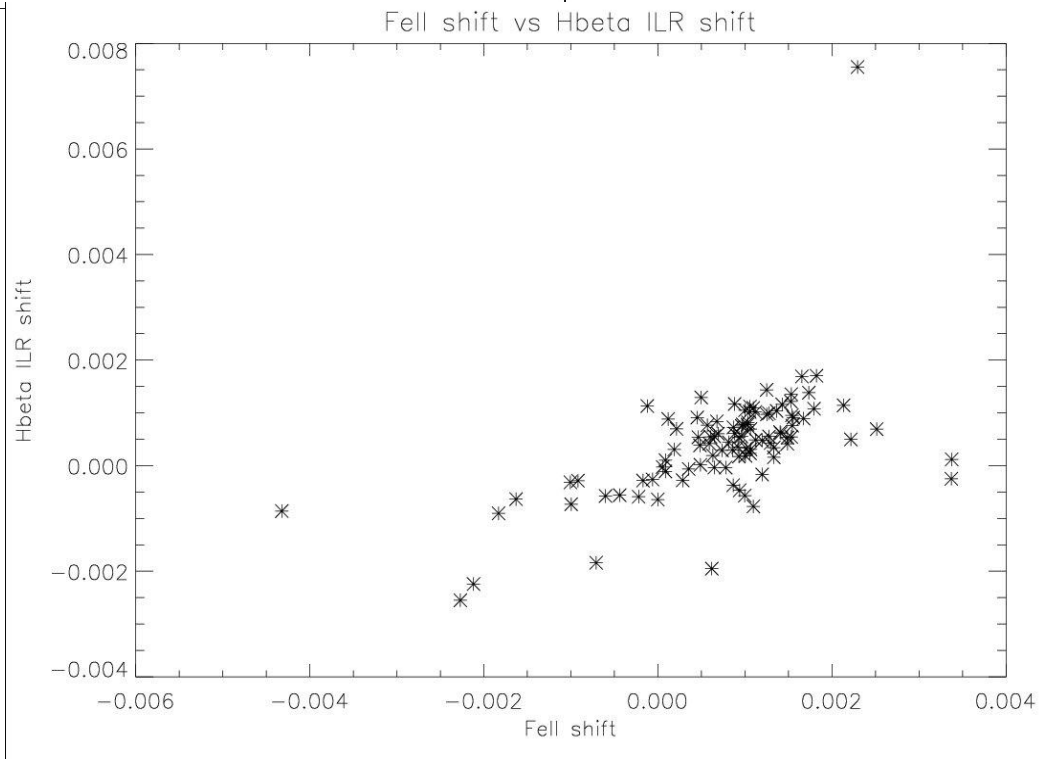


Optical Fe II and Balmer Widths

P 0.6818
R 5.77E-15



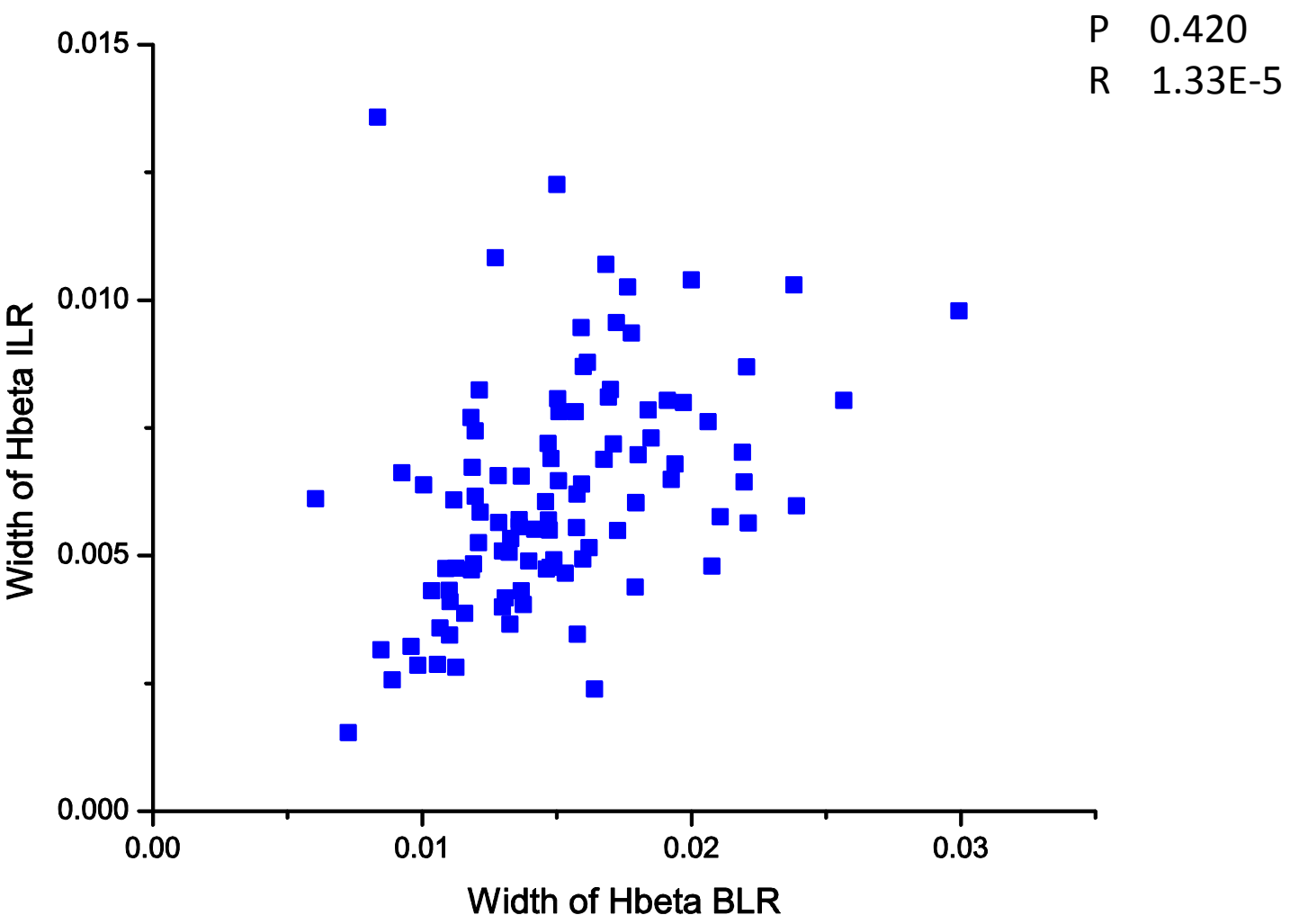


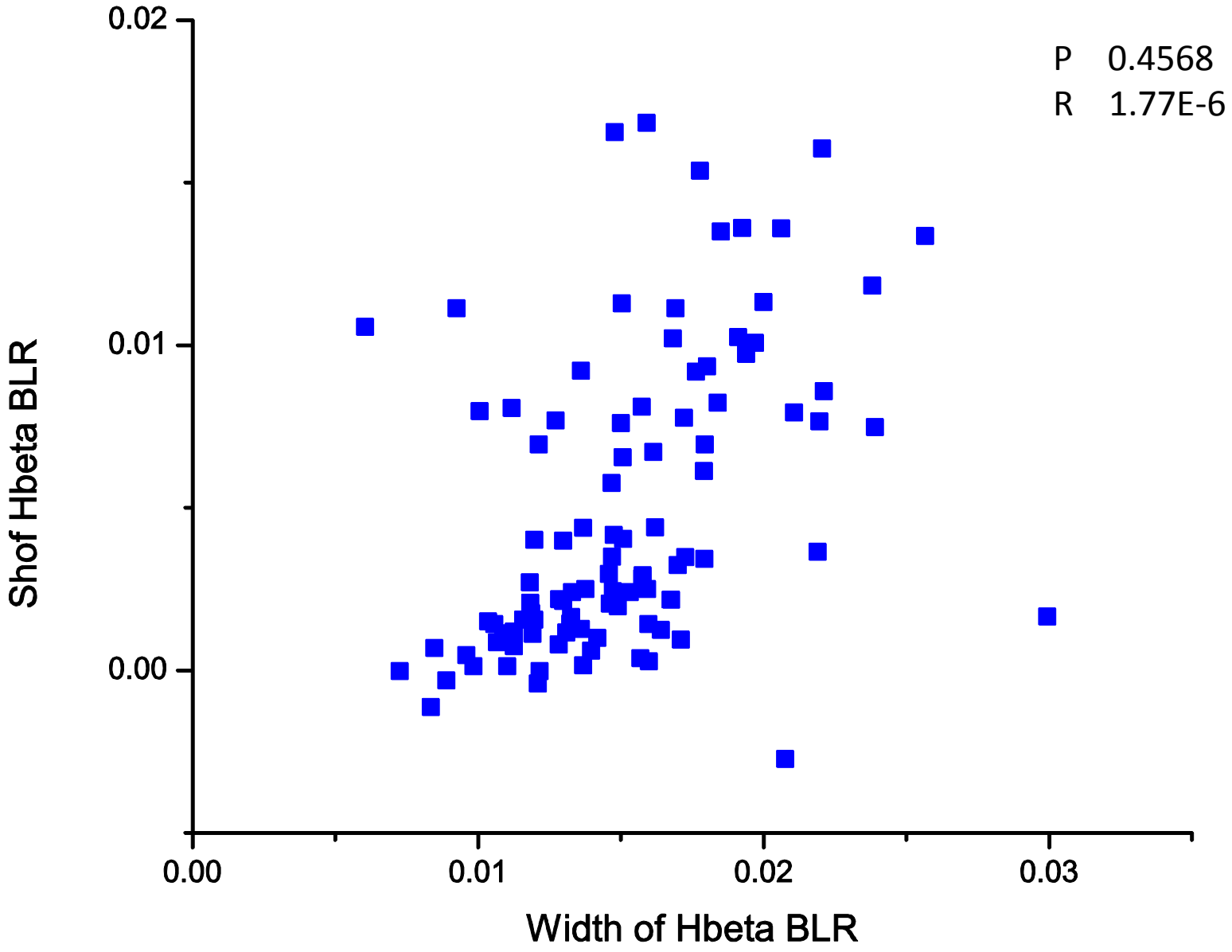


Optical Fe II and Balmer Shifts

P 0.54703
R 3.89E-9

Few more correlations




P 0.4568
R 1.77E-6
Shof Hbeta BLR
Width of Hbeta BLR
0.02
0.01
0.00
0.00
0.01
0.02
0.03

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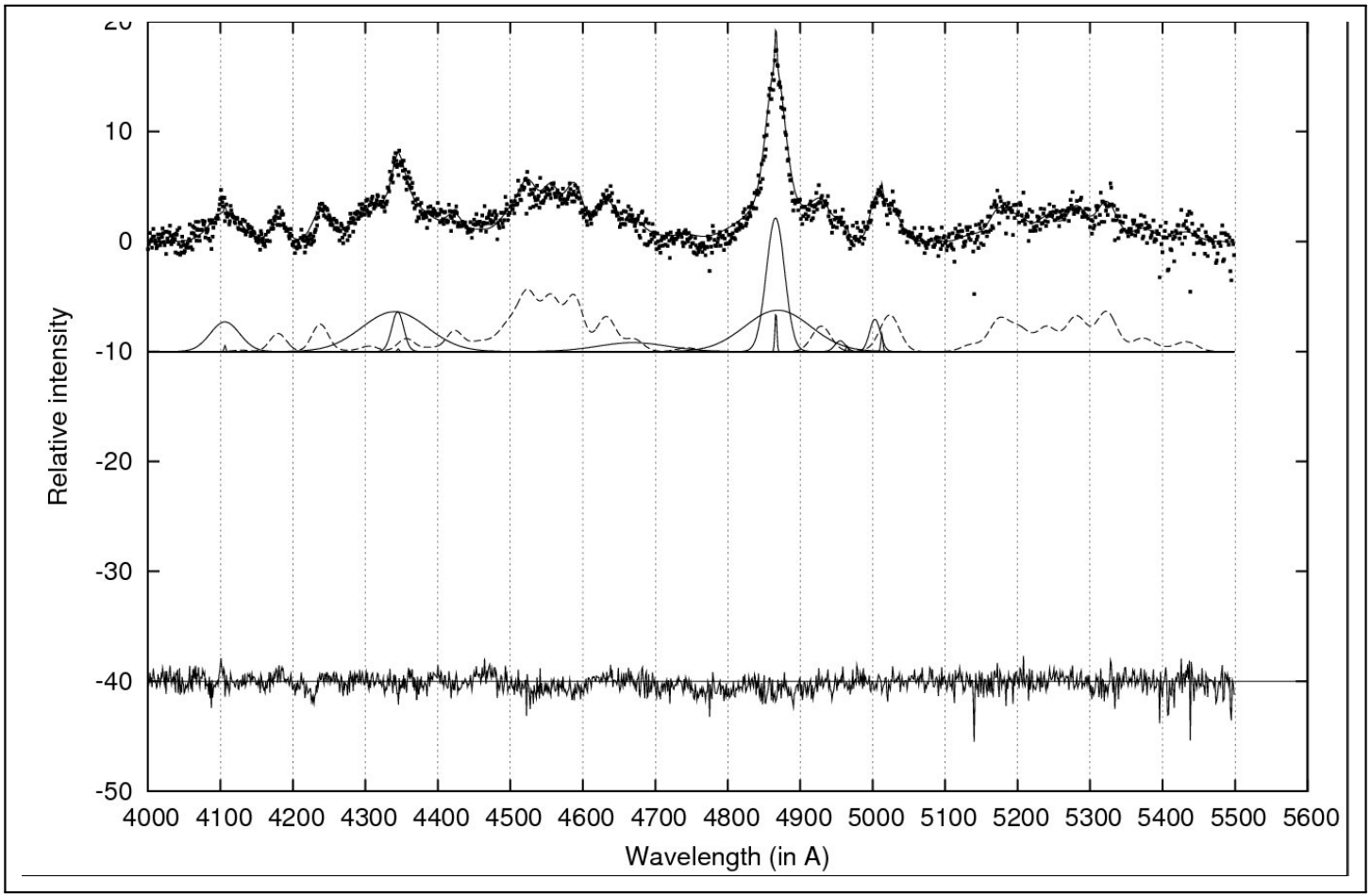
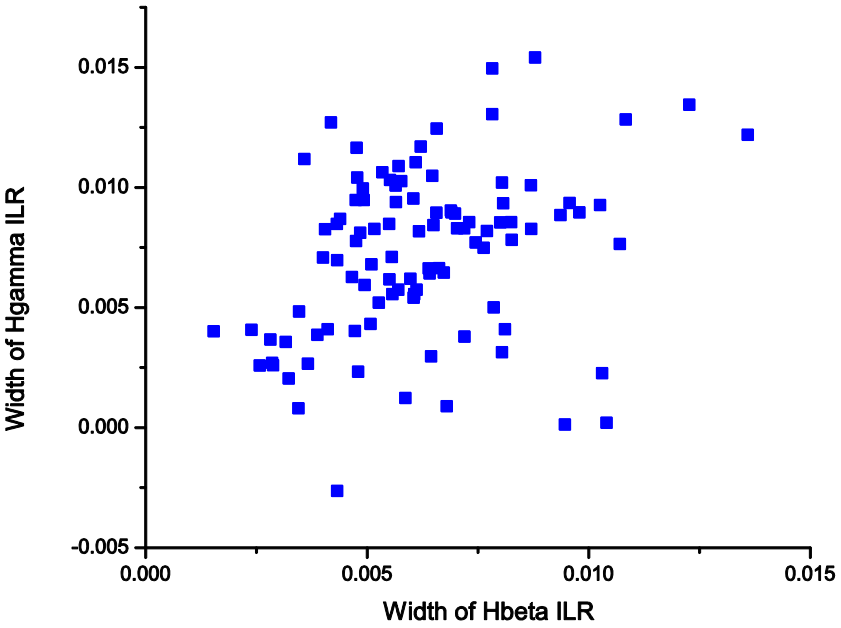
Plan for Future

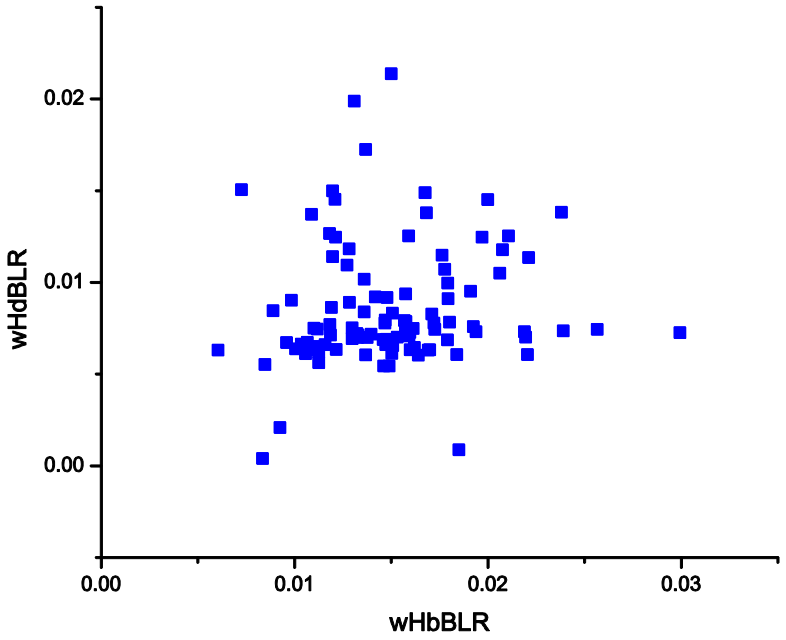
1) Force all the parameters (width and shift of H_β, H_γ etc.) of Balmer lines to be same and check these 100 spectra again.

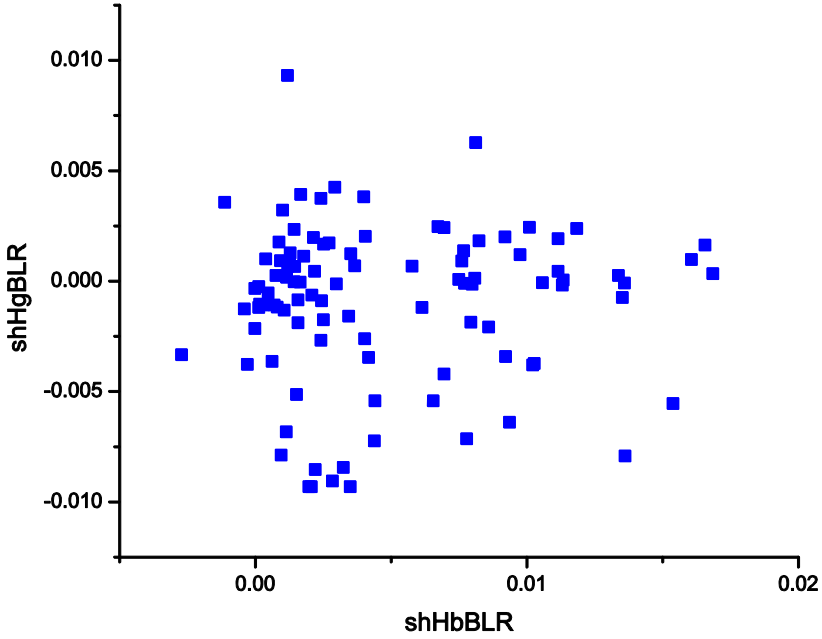


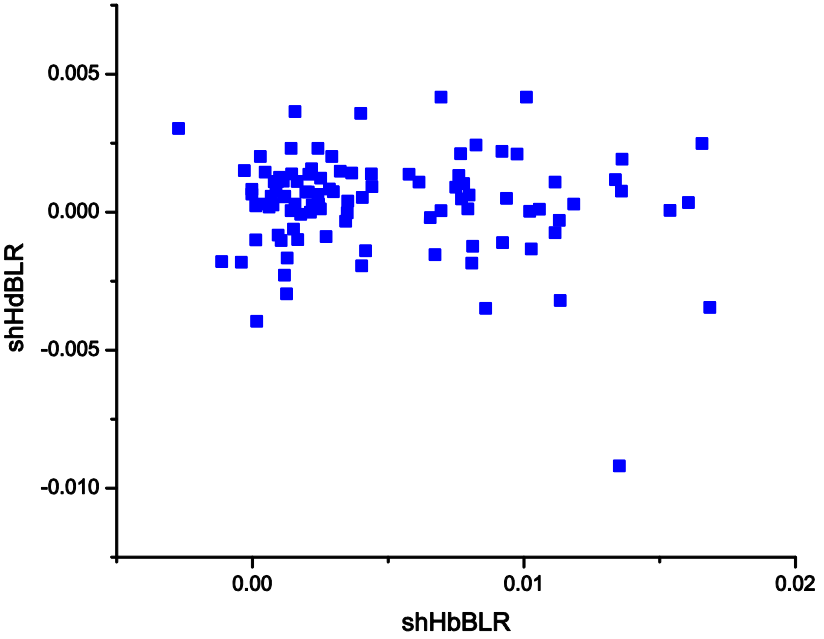
Width and Shift of Hbeta and Hgamma

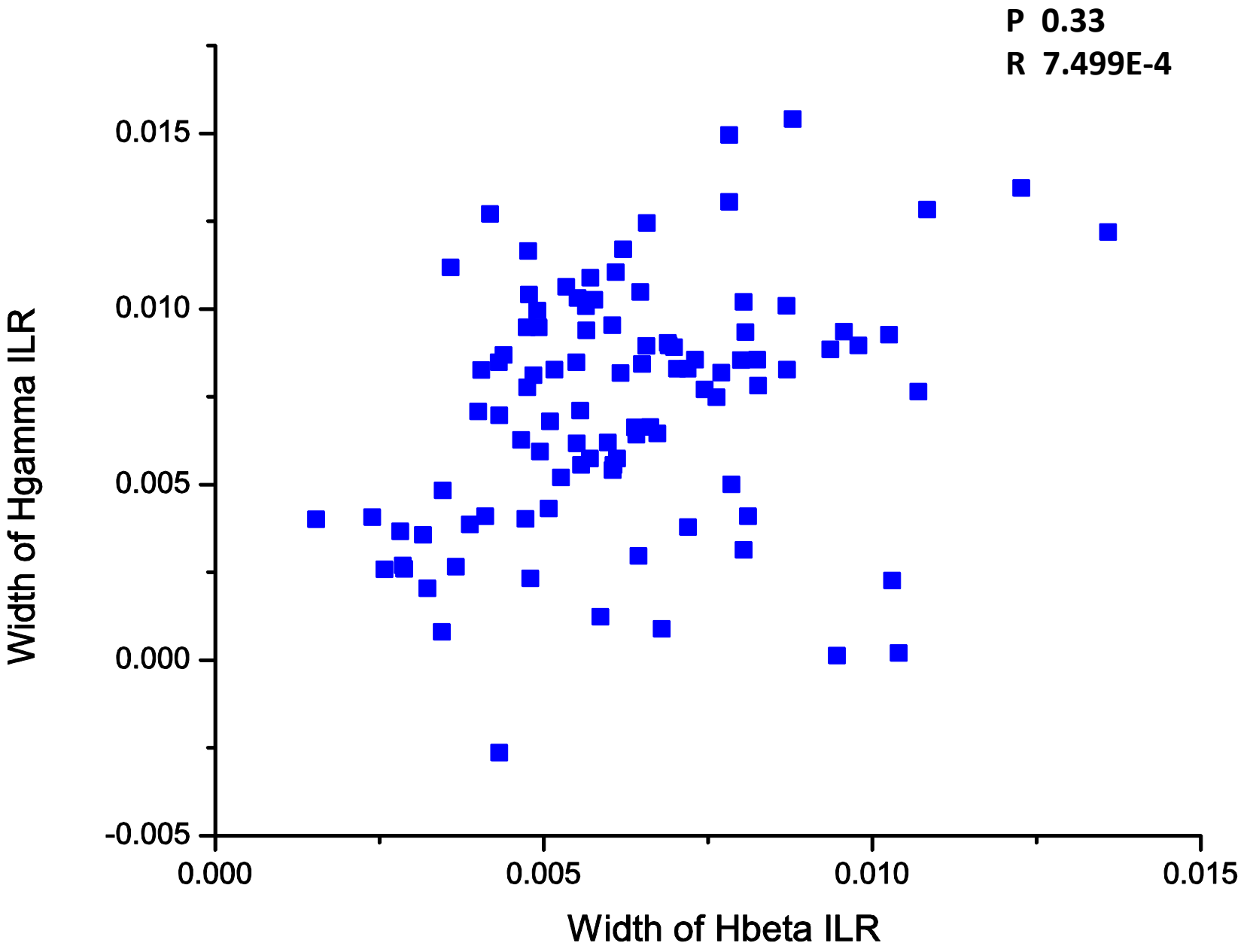


Width and Shift of Hbeta and Hdelta



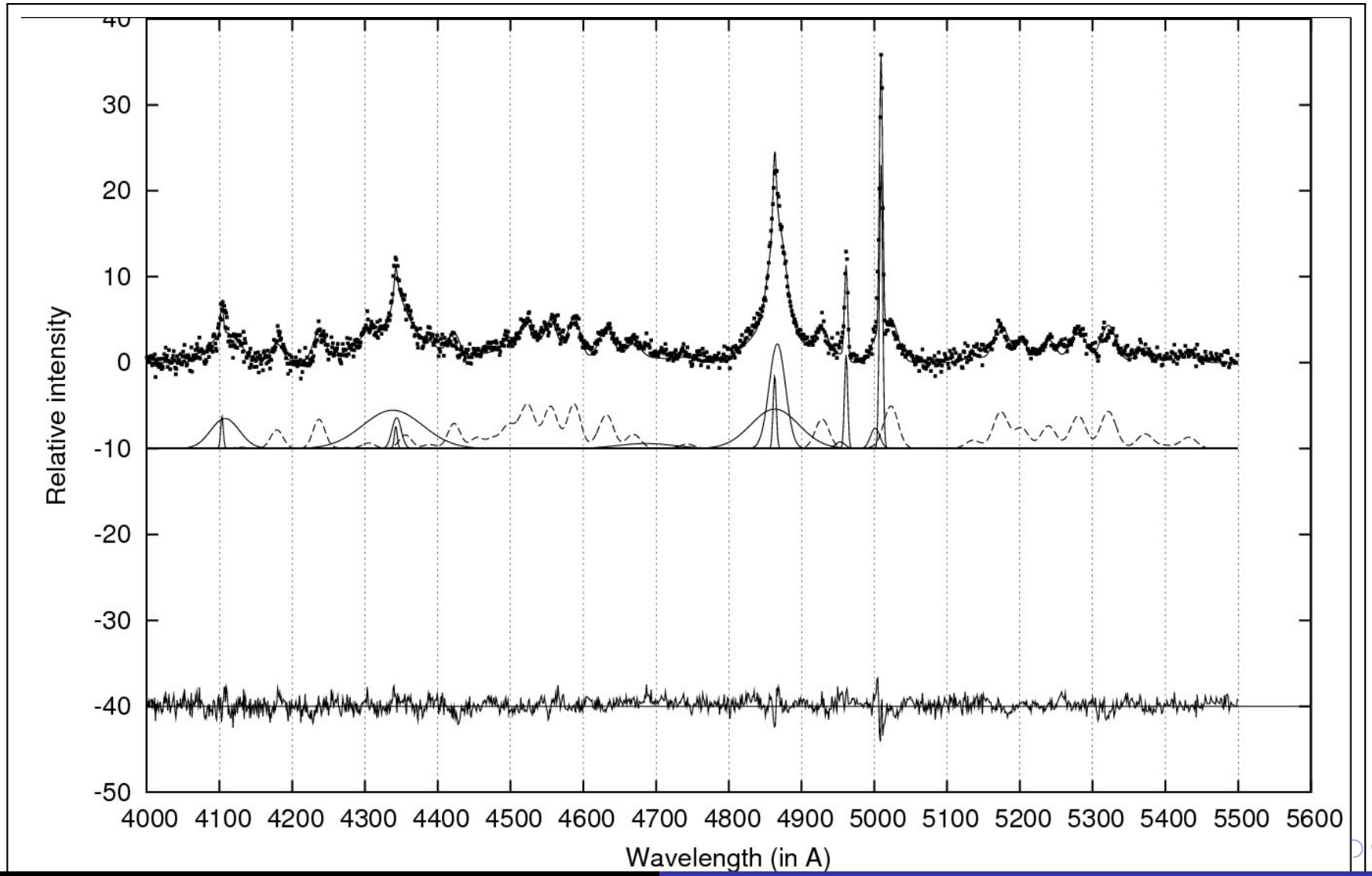





P 0.33
R 7.499E-4
0.015
0.010
0.005
0.000
-0.005
0.000
0.005
0.010
0.015
Width of Hgamma ILR
Width of Hbeta ILR

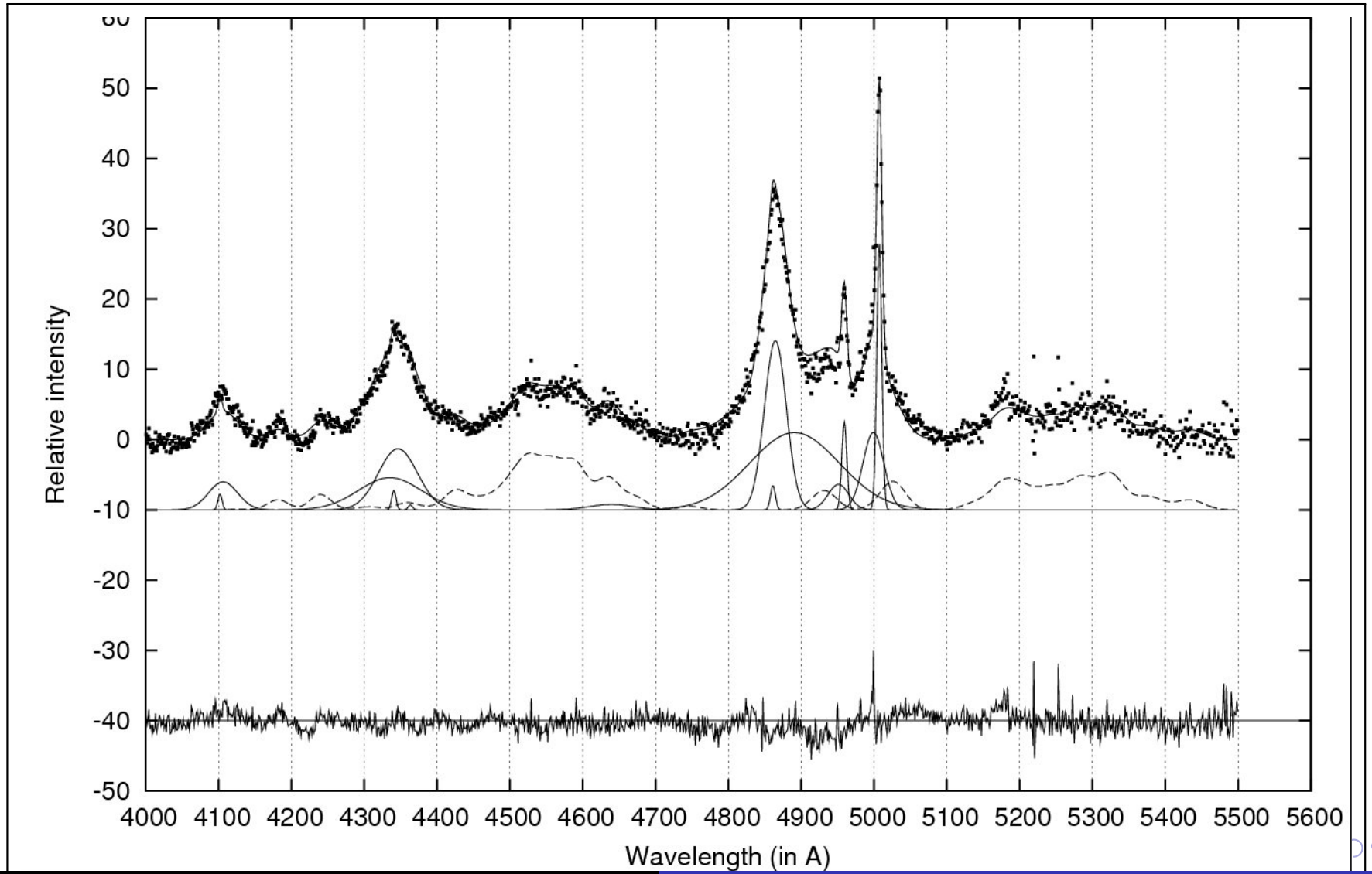
Plan for Future

Few of the spectra have nice correlation between these properties -



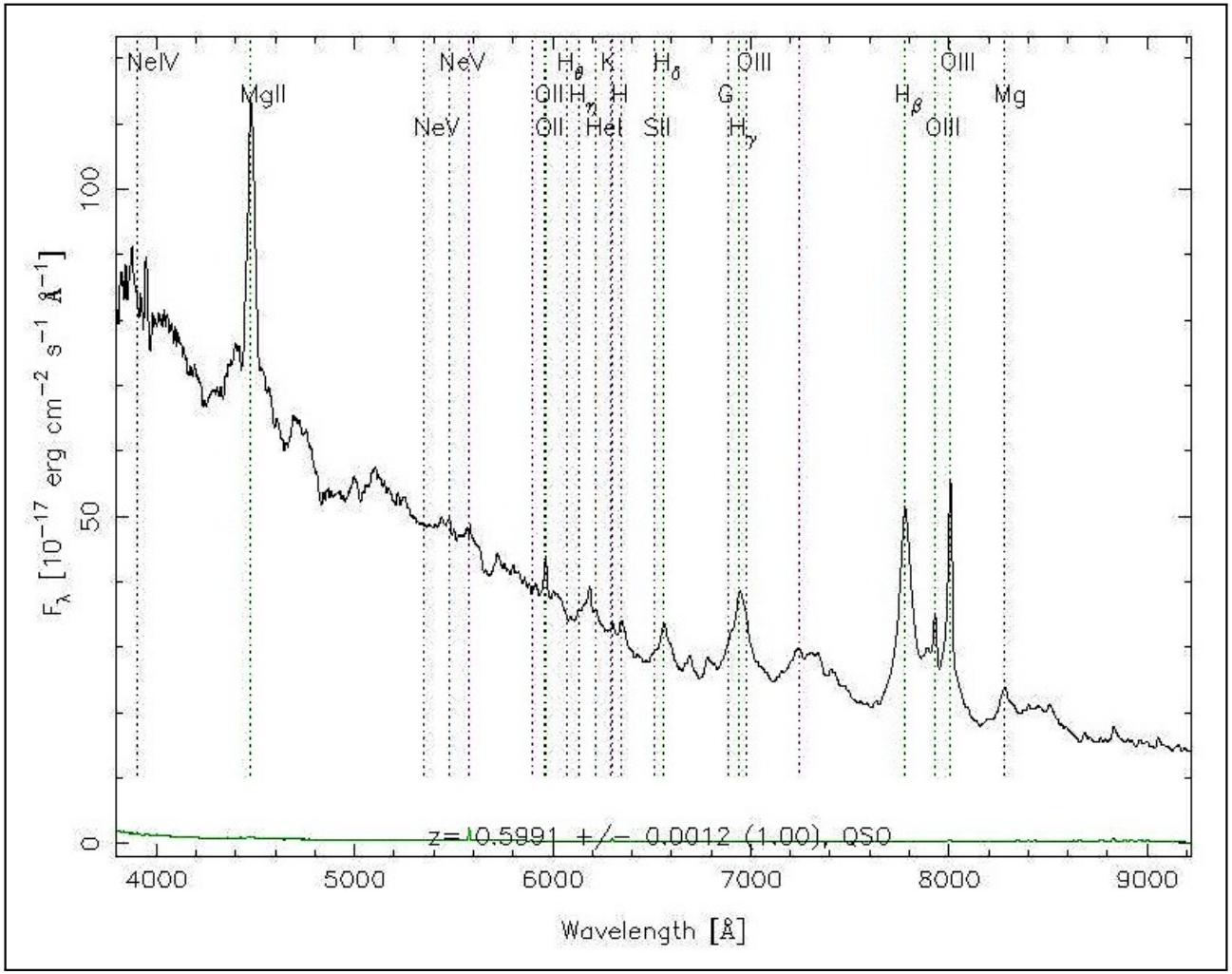
Plan for Future

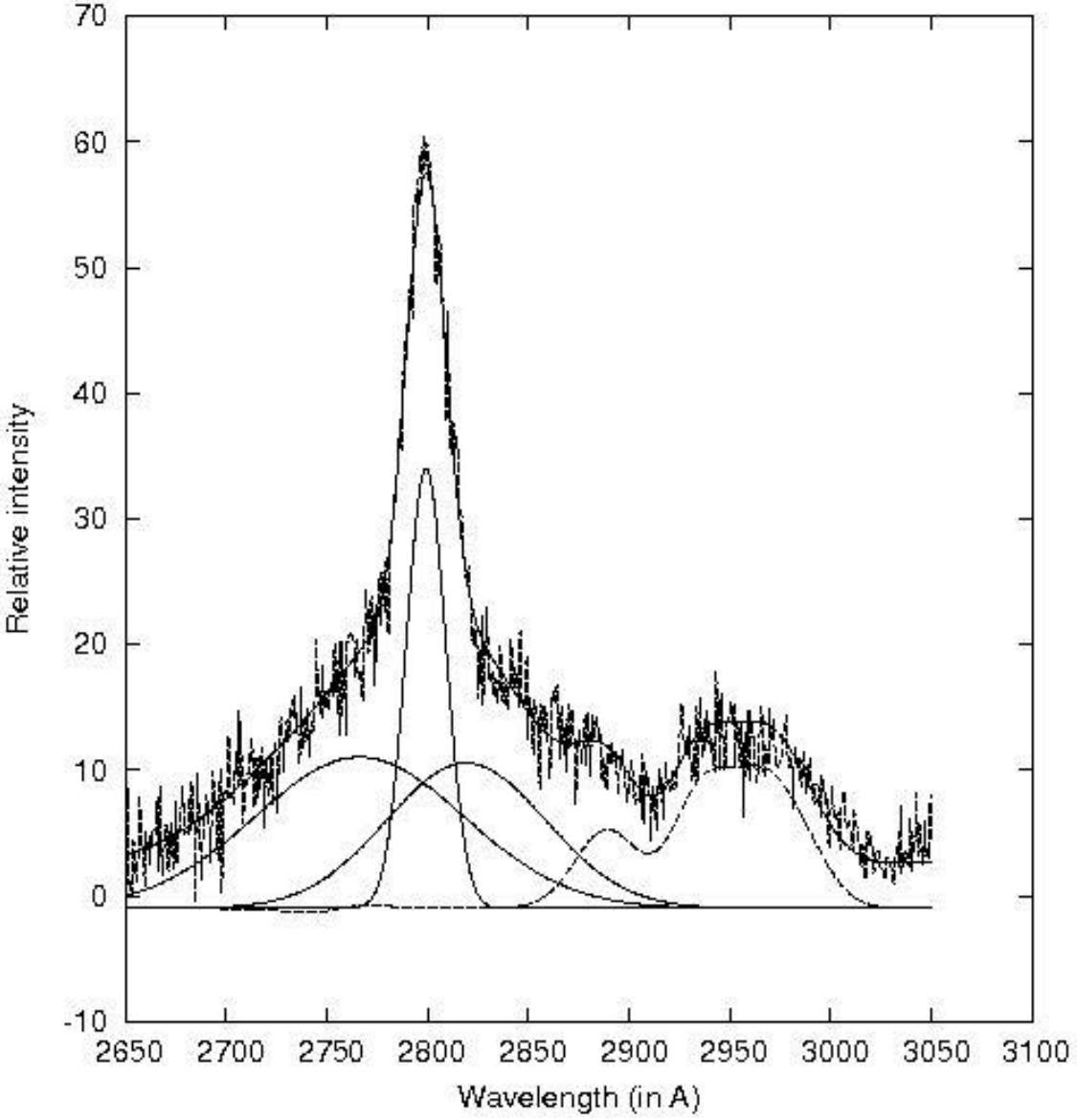
Few others might prove to be a bit problematic -



Plan for Future

2) Fit the lines for other half of the spectra too (2900-4000$\dot{A}$)





Mg II line in UV

Plan for Future

Use the new parameters to explore -

1. Correlation between Optical and UV iron lines
2. Correlation between H_β in optical and M_g in the UV part of the spectra.

Thank You