

## Chapter 14 : Summary and Conclusions

### 14.1 : Broad Absorption-Line and Continuum Time-Variability

Of the 54 BALQSOs studied for broadband variability, 18 showed significant continuum variability (see chapter 8 for the criteria used). Of the 23 BALQSOs with at least two epochs of spectral data on the BALs, we find 15 that show significant BAL time variability. Whether we detect spectral variability depends on a number of factors. The observational biases include: (1) the number of epochs over which the BALs were observed, (2) the S/N of the spectra, and (3) the wavelength range observed. The object biases include: (1) which lines were most easily visible, *e.g.* N V is only easily observed for  $z_e \gtrsim 1.7$ , (2) the extent and optical depth of the troughs observed, and (3) the ionization parameter. Finally, since there are usually only two or three spectral epochs for each object, the probability that variations occur during the period of observations will be important. The spectral variations we see are consistent with the idea that most BALQSOs show some BAL variability during a period of not more than about 10 years.

It is difficult to quantify the variations, since the strength of the changes will depend on which ions are observed and the value of the ionization parameter. For the purposes of this work, we qualitatively group the BALQSOs (by BAL variability) into four categories: (0) those BALQSOs which showed no significant variability, (1) those that showed small changes (obvious only after careful continuum matching and comparisons), (2) those that showed moderate changes (fairly obvious even without careful analysis), (3) those that showed large changes (obvious even in the raw, uncorrected data). Of the 23 BALQSOs with multi-epoch spectral data, eight are in category 0, six are in category 1, five are in category 2, and four are in category 3. For the readers reference, the QSOs in category 3 are: 0019+0107, 0842+3431, 0846+1540, and 1423+5000. In category 2 we have: 0119+0310, 0146+0142, 0957-0535, 1413+1143 and 1700+5153. In category 1 we have: 0029+0722, 0145+0416, 0932+5006, 1011+0906, 1246-0542, and 1309-0536. Inspection