Chapter 12 : Spectra - General Results and Overall Analysis

12.1 : Composite BALQSO Spectrum

In order to investigate the overall characteristics of a BALQSO spectra, we have created a *composite* spectrum by averaging all the the data on the 28 BALQSOs which were monitored for this project. For each QSO, the spectra from all epochs, with all resolutions, were averaged after rescaling the spectra such that their continua matched. All wavelengths were rescaled to the rest frame of the QSO using the measured emission-line redshift. To remove the biases of individual objects on the composite as much as possible, we normalized all the individual QSO spectra, and then averaged the spectra with equal weightings. Although this does not optimize the S/N, each QSO is represented equally over the wavelengths for which there exists data.

We present the normalized intensity composite BALQSO spectrum in figure 12–1. For comparison, the LBQS (Large, Bright Quasar Survey) composite QSO spectrum (as presented in Francis *et al.* 1991), is also shown. Prominent emission lines are labeled in the LBQS spectrum and marked in the BALQSO spectrum. The positions of strong BALs are also indicated in the BALQSO spectrum. Since emission is additive, the BELs shown represent the average shape and intensity of the emission lines from the set of 28 BALQSOs. The absorption, however, occurs at different velocities, so the composite BALs do not represent an average BAL, but do show the relative distribution of deep troughs as a function of wavelength.

The LBQS composite specifically excluded QSOs with BALs so this spectrum represents an average non-BALQSO* spectrum.

Weymann, Morris, Foltz, & Hewett 1991 (hereafter WMFH), studied the emission-line properties of BALQSOs and non-BALQSOs and found general similarities with a few

* A "non-BALQSO" is usually defined as an optically-selected, non-radio-loud (see §2.8) QSO which does not show strong BALs.