

In particular, the radiation between $0.5\text{--}1\mu\text{m}$ is poorly understood (see above), and it is not clear that the same continuum model can be applied to a wide range of luminosities and redshifts. We may be able to obtain agreement with the observations if the flux varies more in the UV than what is predicted by a simple change in α , but this may involve adding yet another component to the continuum source.

Finally, we note that there should be an decrease in variability between V ($\lambda_o \sim 5500\text{\AA}$) and r band observations of roughly 15%. For the four variable QSOs where we have with sufficient V and r band observations, only two have larger deviations in V. Unfortunately, this result is not significant since $\Delta M \sim 0.15$ magnitudes, which means that the expected difference in deviations between V and r is only ~ 0.02 magnitudes, which is on the order of our error.

8.5.2 : Age Dependent Variability

It is possible that the excess of variability at high redshift is due to younger QSOs being more variable. If we imagine that the birthrate of QSOs is constant starting from a time T^* (age of universe minus “lookback” time) and the era of variability for any given QSO lasts for T_v , then the fraction of highly variable young QSOs will decrease with time T as $T_v/(T - T^*)$, for $T - T^* > T_v$. If the QSO phenomenon has a finite life time (T_L) within its host galaxy, then the fraction of young QSOs will approach a constant: T_v/T_L , when $T - T^* > T_L$. Of course, the QSO birthrate is probably not constant and may increase with time in the early universe, boosting the fraction of young QSOs at later times. It may also decrease at large times as the number of available young host galaxies diminishes (assuming that the QSO phenomena occurs early in the life of a galaxy), so we would expect very few young QSOs at recent times.

In any case, qualitatively we should see a significant increase in young QSOs at high redshift. Thus monitoring a sample of high redshift ($z_e > 3.5$) QSOs may allow us to distinguish whether the apparent variability increase at high redshift is truly an age dependent phenomenon or simply a manifestation of a changing spectral slope and observed