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Progress Report

LONG TERM VARIABILITY OF Si IV AND C IV BROAD ABSORPTION TROUGHS OF 10 BALQSOs

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Broad absorption lines (BALs) in quasar spectra identify powerful and high velocity outflows emanating from the central regions that power the QSOs. The structure, evolution and physical properties of these outflows still remain open questions. A method that can provide useful information that could potentially help answer these questions, is variability of broad absorption lines. In this paper we study the variability of BALs by performing multicomponent analysis of Si IV and C IV broad absorption troughs in the case of 10 BALQSOs. By analyzing each Si IV and C IV BAL trough to the individual and uniquely determined components it consists of, we are able to study not only the variability of the whole absorption trough but also the variability of each individual component that contributes to the formation of a BAL. As a consequence, we have the advantage to study the variations of the individual absorbing systems in the line of sight. We do not find any evidence of acceleration as the velocity shifts of individual components for all studied BALQSOs do not change as a function of time. Furthermore, the FWHMs of individual components remain constant as a function of time. In our sample of 10 BALQSOs, all variable components show changes in the optical depths at line centers which are manifested as variations in the EW of the components. In general, Si IV has higher incidence of variability than C IV and in cases where both ions vary over corresponding velocities, Si IV is more variable than C IV. From our analysis, evidence is in favor of different covering fractions between C IV and Si IV. Finally, although most of our results favor the crossing cloud scenario as the cause of variability, there is also strong piece of evidence indicating changing ionization as the source of variability. Thus, a mixed situation where both physical mechanisms contribute to BAL variability is the most possible scenario.