S01a A Census of Intrinsic Narrow Absorption Lines at $z\sim3.0$

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Accretion-disk wind models are currently the favorite dynamical models for the emission-line regions of quasars. An alternative and very useful diagnostic tool for studying such outflows is provided by the narrow, intrinsic absorption lines. But we have to separate absorption lines arising in gas intrinsic to the quasar (intrinsic NALs) from lines arising in gas that is very distant from the quasar (intervening NALs; produced in quasar host galaxies, intervening galaxies, or intergalactic structures). For the purpose of identifying intrinsic NALs, we have searched HS1603+3820 (observed with Subaru/HDS) and 40 other quasars at redshifts between 2 and 4 (observed with Keck/HIRES). In these spectra, we have identified 224 doublets of SiIV, CIV, and NV, of which 25 are associated (within 5000 km s^{-1} of the quasar redshift). We have used partial coverage analysis to distinguish between intrinsic NALs and intervening NALs. About half of the associated systems are intrinsic. Most of these were diagnosed through partial coverage in the NV doublet. However, for non-associated systems NV lies in the Lyα forest, so a direct comparison cannot be made. For all CIV NALs (associated and non-associated), we found that the ejection velocity distribution does not show a significant clustering trend near the quasars, in contrast to some previous studies at lower redshift (e.g. Foltz et al. 1986). As for HS1603+3820 (z_{em}=2.542), we have already observed it twice, and detected time variability of NALs at $v_{ej} = -11{,}000$ (C_f ∼0.3). Using the variability time scale of $t_{var} \sim 0.36$ years, we evaluated the electron density and the absorber's distance from the quasar to be $n_e > 3.2 \times 10^4$ cm^{-3} and $R > 3,500$ pc, respectively.