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Broad absorption lines in DESI Y1 QSO spectra

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Accurate quasar classifications and redshift measurements are increasingly important to precision cosmology experiments. Broad absorption line (BAL) features are present in 15-20% of all quasars, and these features can introduce systematic redshift errors, and in extreme cases produce misclassifications. We quantitatively investigate the impact of BAL features on quasar classifications and redshift measurements with synthetic spectra that were designed to match observations by the Dark Energy Spectroscopic Instrument (DESI) survey. Over the course of five years, DESI aims to measure spectra for 40 million galaxies and quasars, including nearly three million quasars. Our synthetic quasar spectra match the signal-to-noise ratio and redshift distributions of the first year of DESI observations and include the same synthetic quasar spectra both with and without BAL features. We demonstrate that masking the locations of the BAL features decreases the redshift errors by about 1% and reduces the number of catastrophic redshift errors by about 80%. We conclude that identifying and masking BAL troughs should be a standard part of the redshift determination step for DESI and other large-scale spectroscopic surveys of quasars.

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