Probing diffuse interstellar bands with two million lines of sight from the Sloan Digital Sky Survey

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We use two million spectra of stars, galaxies, and quasars from the Sloan Digital Sky Surveys 1, 2 & 3 (SDSS) to probe diffuse interstellar bands (DIBs) across the sky. In contrast to traditional studies based on individual star spectra, we apply a statistical method allowing us to detect absorption features below the noise level of a single spectrum and detect DIB absorption at the 1% level. We map this absorption across a wide range of galactic environments and show how it relates to various ISM tracers. This large dataset also allows us to push the statistical analysis beyond the study of mean spectra. We obtain some insight into the existence of different DIB families by performing a principal component analysis (PCA) of the absorption features, which shows how different series of DIBs are related to each other across the range of optical wavelengths.