Absolute Relative Flux Calibration for the Dark Energy Survey

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Abstract

This project delves into the realm of data analysis for photometric values, aiming to surpass the precision achieved by prior calibrated surveys. Its focal point is the enhancement of accuracy within the Dark Energy Survey, striving to narrow the uncertainty of absolute relative flux from 1% down to 0.5%. To accomplish this ambitious goal, our investigation concentrates on pure hydrogen white dwarfs (DA white dwarfs) and standard stars sourced from the Sloan Digital Sky Survey (SDSS). Employing the powerful capabilities of the Image Reduction and Analysis Facility (IRAF), we meticulously extract instrumental magnitudes from both the standard stars and DA white dwarfs. The pivotal role of the standard stars lies in quantifying the lost photons, which disperse through Earth's atmosphere, known as the extinction coefficient. Upon establishing this coefficient, we can then apply it to the DA white dwarfs, thus rendering their magnitudes standardized and comparable. Ensuring the integrity of our photometric values, we undertake an additional cross-validation technique known as synthetic photometry. This process leverages the spectral characteristics of the target star to compute an anticipated photometric magnitude. By scrutinizing the alignment between these computed values and our experimental data, we ascertain agreement and pinpoint any discrepancies, should they arise, in pursuit of a deeper understanding of their origins.