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Unveiling Iodine-Calibrated RV Spectroscopy

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An iodine cell placed in the light path of a high-resolution spectrograph can act as a simultaneous wavelength and point-spread-function fiducial which enables precise radial velocities to be extracted from un-stabilized or slit-fed spectrographs. This technique enabled the detection and characterization of many of the first known exoplanets and played a significant role in establishing the study of exoplanets as a subfield of astronomy. However, the pipelines needed to extract precise velocities from the data are extremely complex and generally treated as a “black boxes” for many end users. I will explain the methodology of the iodine technique in detail and unveil some aspects often pushed under the rug. I will show some of the sources of systematic noise present in the final velocities and describe potential avenues for the removal of these systematics from the vast library of archival data. I will discuss some of the limitations inherent to the technique, paths to improve iodine-based instrumentation, and the role of iodine RV spectroscopy in the future.

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