Atomic and Molecular Calibration Sources for High-Precision Astronomical Spectrometers

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Abstract. The search for extrasolar planets requires calibration sources with a weighted-average precision and accuracy of a few parts in 10^9 or better. While laser frequency combs easily achieve this requirement, such sources are too expensive and too complex for most astrophysical spectrometers. We have established and investigated potential and existing atomic and molecular calibration sources for the optical and near-infrared. These include commercial hollow cathode lamps of thorium argon (optical and near infrared) and uranium neon (near infrared), as well as a series of molecular gas cells (H_2C_2, $H^{13}CN$, ^{12}CO, ^{13}CO, and CO_2) that are utilized by the telecommunications industry (1.5 μm — 1.65 μm). We present the current status of these sources and their applicability to current and future astrophysical spectrometers.

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