

Wavelengths, energy levels and hyperfine structure of Mn II and Sc II

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Abstract. We summarize our analysis of singly-ionized elements of astrophysical interest.

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For many decades, the Atomic Spectroscopy Groups at the National Institute of Standards and Technology (NIST) and Imperial College London (ICL) have measured atomic data of astronomical interest. Our spectrometers include Fourier transform (FT) spectrometers at NIST and ICL covering the region 1350 Å to 5.5 μm and a 10.7-m grating spectrometer at NIST covering wavelengths from 300 Å to 5000 Å. Sources for these spectra include high-current continuous and pulsed hollow cathode (HCL) lamps, Penning discharges, and sliding spark discharges. Recent work has focused on the measurement and analysis of wavelengths, energy levels, and hyperfine structure (HFS) constants for iron-group elements. The analysis of FT spectra of Cr I, Mn I, and Mn II is being led by ICL and is described in a companion paper (Pickering *et al.* 2015, this volume). Current work being led by NIST includes the analysis of HFS in Mn II, analysis of Mn II in the vacuum ultraviolet, and a comprehensive analysis of Sc II.

Comprehensive HFS constants for Mn II are needed for the interpretation of stellar spectra, and incorrect abundances may be obtained, when HFS is omitted. Holt *et al.* (1999) have measured HFS constants for 59 levels of Mn II using laser spectroscopy. We used FT spectra of Mn/Ni and Mn/Cu HCLs covering wavelength ranges from 1350 Å to 5.4 μm to confirm 20 of the A constants of Holt *et al.* (1999) and obtain values for 47 additional levels.

Spectra of Sc HCLs have been recorded from 1800 Å to 2.5 μm using FT spectrometry at NIST. Additional measurements to cover wavelengths below 1800 Å and above 2.5 μm are in progress. The spectra are being analyzed to derive improved wavelengths, energy levels, and hyperfine structure parameters.

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References

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