Line lists for the IRIS near ultraviolet wavelength bands

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Peter R. Young
pyoung9@gmu.edu
George Mason University & NASA Goddard Space Flight Center

This document is not complete but the identifications and wavelengths given in the tables are correct.

A list of transitions within the IRIS near ultraviolet (NUV) waveband is given in Table 1. For each line the transition information and the reference to the wavelength are given. A key for the wavelength references is given in Table 2. Notes on individual emitting species are given in Section 1.

Every line listed in these tables has been postively identified by the author in IRIS spectra, although many of the lines are only seen in specific solar features such as flares. Some of the lines are only seen in absorption against the strong Mg II lines.

In normal solar conditions only the Mg II h and k lines are in emission. In flares and other dynamic phenomena some of the other chromospheric lines go into emission, most notably the Mg II triplet lines.

Table 1: Lines in the IRIS NUV 2782.7–2835.1 Å channel.

Species	$\lambda_{\rm ref}$	Ref.	Transition
Mg II	2791.600	2	$3p\ ^2P_{1/2} - 3d\ ^2D_{3/2}$
Fe II	2794.711	1	a $^4G_{9/2}$ – z $^4I_{11/2}$
Mn I	2795.641	1	a $^6\mathrm{S}_{5/2}$ – y $^6\mathrm{P}_{7/2}$
Mg II	**2796.352**	2	$3s\ ^2S_{1/2} - 3p\ ^2P_{3/2}$
Mg II	2798.754	2	$3p\ ^2P_{3/2} - 3d\ ^2D_{3/2}$
Mg II	2798.823	2	$3p\ ^2P_{3/2} - 3d\ ^2D_{5/2}$
Mn I	2799.094	1	a $^6\mathrm{S}_{5/2}$ – y $^6\mathrm{P}_{5/2}$
Ni I	2799.476	1	$3d^9(^2\mathrm{D})4s\ ^3D_2 - 3d^8(^3\mathrm{F})4s4p(^3\mathrm{P})\ ^1D_2$
Mn I	2801.907	1	a $^6\mathrm{S}_{5/2}$ – y $^6\mathrm{P}_{3/2}$
Mg II	**2803.530**	2	$3s\ ^2S_{1/2} - 3p\ ^2P_{1/2}$
Fe II	2813.322	1	b $^2P_{3/2}$ – y $^4P_{3/2}$
Fe II	2814.450	1	a $^4G_{7/2}$ – z $^4I_{9/2}$
Fe II	2820.173	1	a $^4G_{11/2}$ – z $^4H_{11/2}$
Fe II	2824.159	1	a $^4G_{11/2}$ – z $^4H_{13/2}$
Fe II	2826.580	1	a $^4G_{11/2}$ – z $^4G_{9/2}$
Fe II	2832.394	1	b $^2P_{3/2}$ – z $^2D_{5/2}$

1. Discussion of species in wavebands

1.1. Mg II

The "triplet" lines are so named because there are three transitions between the $3p\ ^2P$ and $3d\ ^2D$ atomic terms. Two of them are close together at 2798.75 and 2798.82 Å, while the third is at 2791.60 Å.

1.2. Fe II

A number of Fe II transitions go into emission during flares, and Kowalski et al. (2017) highlighted lines at 2814.45 and 2832.39 Å observed in the 2014 March 29 X-flare.

Comment: in flares it seems the strongest Fe II lines have upper levels at about 61 000 cm−1. Lines from upper levels with higher energies seem to be absent.

1.3. Ni I

The absorption line at 2799.476 Å is commonly used for wavelength calibration.

1.4. Mn I

Three strong absorption lines are prominent between 2795 and 2802 Å. The lines can go into emission during flares. Note that Mn I is isoelectronic with Fe II and a similar level labeling system applies.

Table 2: Sources of reference wavelengths.

Index	Reference
1	NIST
2	CHIANTI

References

Kowalski, A. F., Allred, J. C., Daw, A., Cauzzi, G., & Carlsson, M. 2017, ApJ, 836, 12

A. Update history

Version 0.2 Added section on Mn I; other minor additions.