GES linelist V6

2016-12-07

Citation policy
Until further notice, all publications based on these data shall cite (Heiter et al. 2015) and Heiter et al. (in prep.). If you wish to use the line-list for non Gaia-ESO related projects, please contact the line-list group.

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Linelist V6
The version 6 release contains the following files:

1 `ges_atom_nohfs-iso_v6.fits`
Line-list for atoms, no hyper-fine splitting (HFS) or isotopic shifts (ISO) 139948 entries, 1341 clean lines

2 `ges_atom_hfs-iso_v6.fits`
Line-list for atoms, including HFS and ISO
141233 entries, 2626 clean lines

The so-called clean line-list forms a subset of the atom_nohfs-iso and atom_hfs-iso line-lists. For these 1341 (nohfs-iso) or 2626 (hfs-iso) lines only, assessments of atomic data quality and blending properties are included through flags. The two atomic lists are complete and mutually exclusive. The molecular line lists have not changed from V5.

The atomic and molecular data are accessible from the Edinburgh archive (`http://ges.roe.ac.uk`, table LineList).

1. Changes in V6

- The log(gf)-value (LOGGF) of NiI 6300.34Å, which blends with the forbidden oxygen line, was changed to from -2.674 (Kurucz 2008) to -2.11 (Johansson et al. 2003).

- The j-values (JLOW and JUP) of 10 lines were corrected. These lines have close fine-structure components that have been merged. The log(gf)-values are unaffected. The lines are: NaI 4982.81Å, CaI 5339.19Å, NaI 5682.63Å, NaI 5688.21Å, OI 6158.19Å, CaII 6456.88Å, MgI 8717.83Å, MgI 8736.02Å, AlI 8773.90Å, and CaII 8927.36Å.

- Two SI lines from (Wiese et al. 1969) were removed, 6748.68Å and 6756.85Å, because they are duplicated in VALD3.

- The central wavelength (LAMBDA) of three MnI lines, 6013.49Å, 6016.64Å, 6021.79Å , were changed from the values in (Den Hartog et al. 2011) to (Kurucz 2007). All hyperfine components were adjusted accordingly.

- Al I lines with log(gf)-reference (LOGGFREF) (Grevesse 2012) where changed to (Mendoza et al. 1995). All atomic data were unaffected.

- Hyperfine splitting and isotopic shifts for NdII lines were recomputed. All non-zero Stark broadening values (STARKDAMP) were set to zero.

- The central line depth in Arcturus (DEPTH) was recomputed, as the two files were previously inconsistent.

- ABO broadening data (VDWDAMP) were implemented for two Fe I lines; 6157.73Å and 8699.45Å.

- The wavelength of all HFS components of Eu II 6645.10Å were shifted by +0.036Å, for consistency with VALD3 instead of VALD2.

1.1. Autoionising lines

The radiative damping (RADDAMP) parameters for Ca I auto-ionising lines 6318.11 Å, 6343.31 Å, and 6361.75 Å were replaced with values derived from the Kurucz lists (`http://kurucz.harvard.edu/atoms/2000/gf2000.all`). The Kurucz lists give three Shore parameters (Shore 1967) describing the radiatively broadened auto-ionising line profile, which is a so-called Fano profile. The first Shore parameter is the radiative width, which is given in frequency units by Kurucz, i.e. $\log_{10}(\Gamma_f)$, where Γ_f is the FWHM in Hz. The radiative damping parameter in the Gaia-ESO line list (and in the Kurucz lists for lines other than auto-ionising lines) is $\log_{10}(\Gamma)$, where Γ is the FWHM in angular frequency units (rad/s). Thus, to convert to the usual radiative damping parameter, one uses $\Gamma = 2\pi\Gamma_f$, and thus $\log_{10}(\Gamma) = \log_{10}(\Gamma_f) + 0.80$, and

this value is now given in the line list. The remaining two parameters given by Kurucz are the Shore parameters describing the profile shape, a and b. All these lines have an asymmetry parameter a of practically zero ($\log_{10}(a) = -30$ cm^2/g) and implies a Lorentz absorption profile with no asymmetry (i.e. the equivalent Fano parameter $q = \infty$; see Shore (1967)). Thus an appropriate radiative damping parameter achieves the same result as the profile according to the Shore parameterisation of the Fano profile. Tests indicate the present data reproduces profiles in standards stars reasonably well.

References

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