A+M DATA: DATA ORGANIZATION IN A+M DATABASES AND THEIR USE FOR STELLAR SPECTROSCOPY

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Determination of accurate fundamental stellar parameters is one of the most important today's task, in particular, with the success of GAIA space mission (http://sci.esa.int/gaia/) that provides accurate kinematic data for thousand millions of stars in our Galaxy and in the Local Group. A combination of these characteristics with the atmospheric parameters allows us to constrain stellar populations and to study the chemical evolution more precisely than before. High-precision spectroscopy provides a unique possibility to derive atmospheric parameters (effective temperture, surface gravity, chemical abundances) for any star because this method is not hampered by spoiling light propagation effects such as interstellar absorption, etc. A brief review of spectroscopic methods is done with a focus on the latest version of SME (Spectroscopy Made Easy) [1]. Fig. 1 demonstrates how accurate one could fit the observed stellar spectrum by the theoretical model with the currently available fundamental atomic parameters – energy levels, transition probabilities, broadening parameters, isotopic and hyperfine splitting, photoionization cross sections, etc. A detailed review of the advances in atomic physics is given by Barklem [2]. I shortly run over the latest laboratory and theoretical A&M data, their organization in different databases – NIST, VALD, ExoMol, TopBase, VAMDC, and their use in SME.

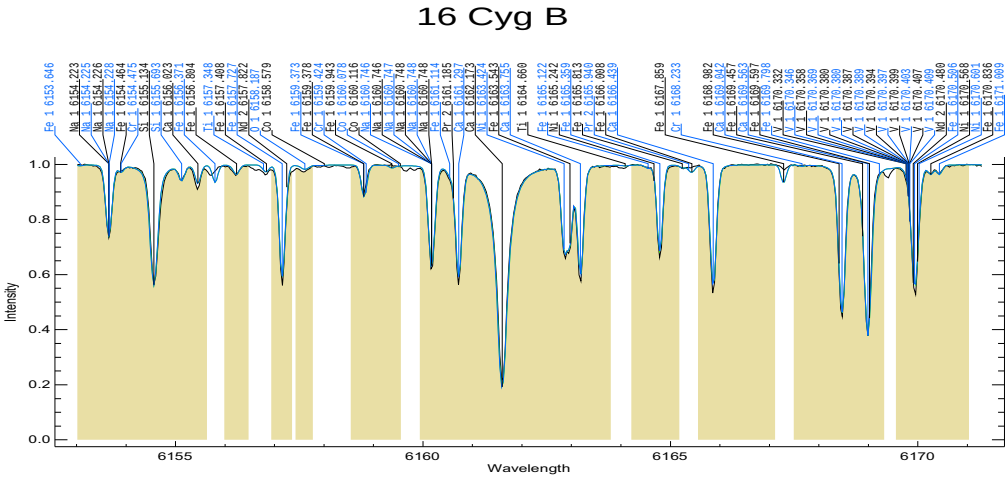

Figure 1: A part of the spectrum of 16 Cyg B – a planet host star of the solar type. Observations are shown by thin black line while thick blue line indicates the NLTE theoretical fit using the best A+M line parameters.

References

[1] N. Piskunov, and J. A. Valenti, Astron. Astrophys. (submitted) (2016).

[2] Paul S. Barklem, Astron. Astrophys. Rev. 24, 9 (2016).