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ATOMIC DATA AND ELECTRON-IMPACT BROADENING OF SPECTRAL LINES OF RARE EARTHS

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Spectral lines of rare-earth elements are present in Solar as well as in stellar spectra, and they principally originate in layers of stellar atmospheres with higher electron density (photosphere or subphotosphere). Consequently, electron-impact broadening mechanism can be important, especially for hot (A and B) stars as well as for white dwarfs.

So, for modelling and spectroscopic diagnostics of stellar atmospheres and envelopes, it is important to have a set of electron-impact broadening data, also for the lines of ionized rare-earth elements.

For example, the reliability of the element abundance determinations in stellar atmospheres depends on a number of factors, where atomic data (transition probabilities, collisional widths, etc.) are among the most important. One of the needed set of atomic data for line synthesis are the electron-impact widths of spectral lines. They are needed in order to solve various problems in astrophysics and physics, for example, diagnostics and modeling of laboratory and stellar plasma, investigation of its physical properties and for abundance determination.

In this lecture, we review the needs for Stark broadening data of rare earth elements, and results of our investigation of influence of electron-impacts with rare earth atoms and ions on the broadening of stellar spectral lines.