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Stark lineshape calculations with different atomic physics data

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Domain : Laboratory data needs and applications

One of the widely used techniques for diagnosing a gas or a plasma is that consisting on the comparison of experimental spectra of emitted lines with calculated line profiles. The accuracy of the results which can be obtained with this method depends not only on the used line shape model but also on the quality of both the measurements and the atomic data. For plasma conditions where Stark broadening is the dominant broadening mechanism, the lineshape code PPP [1,2] developed in our laboratory has proven to give excellent results especially for plasmas of moderate coupling. We propose in this paper to examine how line profiles calculated with the same code PPP are affected by the choice of atomic physics data and how this can affect the deduced plasma parameters. This will be illustrated through profiles of the He I 1s2p ^{3}P-1snd ^{3}D lines (n$\geq$8) [3] calculated with PPP using different atomic physics data (especially the reduced matrix elements of the dipolar transitions). In particular we use singly excited helium data obtained with a hydrogenic approximation and data of Theodosiou [4].

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