XV Serbian Conference on Spectral Line Shapes in Astrophysics, June 9 - 13, 2025, Niš, Serbia
Book of Abstracts, Eds. P. Marziani, M. S. Dimitrijević, L. Č. Popović and Đ. Savić
Astronomical Observatory Belgrade, Special Issues No. 2
https://doi.org/10.69646/15scslsa14

THE LINESHAPE DATABASE PROJECT

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Lineshape calculations rely on complex numerical codes, consuming substantial computational resources. This is particularly true for computer simulation methods [1].

No standard format exists for exchanging these data. Furthermore, these complex lineshapes cannot be easily interpolated. However, such an interpolation is frequently required in practice, for example, to obtain the best fit of an experimental spectrum. Accounting for a distribution of plasma parameters (e.g., due to fluctuations driven by turbulent motion) leading to non-trivial lineshapes [2] increases the number of calculations required.

A fast interpolation procedure is needed to generate a line profile based on a limited number of pre-calculated lineshapes. While this can be done relatively easily in specific applications [3], it is not feasible in more general cases. Although there are some in-house software solutions designed for this purpose [4], they have not been widely adopted. This work aims to develop open-source tools to address these challenges and to be useful and used by both theoreticians and experimentalists.

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