

## THE MODIFIED SEMIEMPIRICAL METHOD 1980-2020

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Forty yers ago, together with Nikola Konjević, we published the modified semiempirical formula, an approximate methods for the calculation of Stark widths of non-hydrogenic spectral lines, for ionized emitters (Dimitrijević, Konjević 1980). With Vladimir Kršljanin we extended this method for the line shifts (Dimitrijević, Kršljanin 1986) and with Nikola Konjević we adapted it for low temperature limit obtaining an even simpler formula (Dimitrijević, Konjević 1987). They were used many times, especially in astrophysics and have been cited hundreds of times. This method is especially useful when it is not possible to perform more sophysticated semiclassical perturbation calculations due to the lack of the needed atomic data. Using this method we performerd calculations of Stark linewidths and shifts for a large number of spectral lines of various ions. The obtained results are included in STARK-B database (Sahal-Bréchet et al. 2015) a part of Virtual Atomic and Molecular Data Center (VAMDC - Dubernet et al. 2010).

In this contribution we will review the Modified Semi-Empirical Method (MSE) and its simplified, low temperature limit form as well as its usage in astrophysics and plasma physics.

### References

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## MYTHOLOGICAL ORIGIN OF CONSTELLATIONS AND THEIR DESCRIPTION: ARATUS, PSEUDO-ERATOSTHENES, HYGINUS

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A long, didactic poem, *Phaenomena* written by Aratus of Soli (Ἄρατος ὁ Σολεεύς; c. 315/310 BC – 240 BC) is the oldest preserved astronomical text in Europe, created about 270 BC. The macedonian king, Antigonus II Gonatas (c. 319-239 BC) probably ordered and financed this work. Aratus sought and found the sources of astronomical knowledge in the work with the same name of Eudoxus of Knid, which he transformed in a poem, making it easier to read and remember. In the following times his poem became very popular, gladly read throughout ancient Greece and then Rome, often translated into Latin, which greatly increased the number of transcripts so that it has been preserved to these days, unlike the book of Eudoxus.

The similar description of mythical origin of constellations is *Catasterismi* (Καταστερισμοί) the only surviving scripture associated before with Eratosthenes of Cyrene (Ἐρατοσθένης ὁ Κυρηναῖος - c. 276 - c. 194 BC), the chief librarian at the Library of Alexandria, whose works were burnt down when it is burned and exist only in fragments. This text came to our time as an *epitome*, a short version of a larger work, and, the unknown author is named Pseudo-Eratosthenes. It is also a famous works of antiquity about heaven and, unlike the text of the similar content (*Phaenomena*) of Aratus, from which many mythological topics in this text have been taken, provides data on the number, and brightness of stars in the described constellations, so that represents a kind of the first preserved star catalogue of ancient Greece.

The third book with the similar content is *De Astronomica*, also known as *Poeticon Astronomicon*, attributed earlier to the Roman historian Gaius Julius Hyginus, though the true authorship is disputed.

## STARK BROADENING OF Co II LINES IN STELLAR ATMOSPHERES

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Stark Full Widths at Half Maximum for 46 Co II multiplets have been calculated (Majlinger et al., 2018, 2020) using modified semiempirical method (Dimitrijević and Konjević, 1980). The obtained results have been used to investigate the significance of Stark broadening mechanism for Co II lines in DA and DB white dwarf and A type star atmospheres. We examined the influence of surface gravity ( $\log g$ ), effective temperature and wavelength of the spectral line, on the importance of the inclusion of Stark broadening contribution in the profiles of the considered Co II spectral lines, for plasma conditions in atmospheric layers corresponding to different stellar opacities.

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