



Contribution ID: 74

Type: **Contributed talk**

The problem of variability of chemically peculiar Am stars

Tuesday, 5 September 2023 14:45 (15 minutes)

The metallic-line (Am) stars, classified as chemically peculiar A and early F stars, exhibit unique spectral characteristics with weak Ca II K and Sc lines, along with strong Fe-group features compared to their H-line spectral type. These stars are located in the classical instability zone, where pulsating delta Scuti stars lie. For many years, it was believed that classical Am stars cannot pulsate due to the gravitational settling of helium in the He II partial ionization zone, which is the driving mechanism for delta Scuti pulsations. However, subsequent studies have revealed pulsations in many Am stars (Smalley et al., 2017, MNRAS, 465, 2662). Antoci et al. (2014, ApJ, 796, 118) proposed that turbulent pressure may be the primary driving mechanism for pulsating Am stars, in contrast to the classical kappa-mechanism.

By conducting a detailed analysis of high-resolution and high signal-to-noise spectra, alongside the analysis of photometric data, we aim to study the problem of variability in chemically peculiar Am stars. We performed spectral classification on approximately 400 stars previously classified as metallic stars, revealing that only about half of them exhibit features typical of Am stars. Furthermore, we have obtained atmospheric parameters and will present the results of our spectroscopic analysis combined with pulsation information for these stars.

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Session Classification: WG2. The Life and Death of Stars (II). Chair: Ivanka Stateva