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Testing stellar opacities using asteroseismology

Opacity data are one of the main ingredients in stellar modelling. They affect the transport of energy and, consequently, the stellar structure. Moreover, the values of opacities determine conditions for excitation of heat-driven pulsations as observed, e.g., in main-sequence or classical pulsators.

Despite many improvements in the calculation of stellar opacities, there are many indications that something is still missing and/or has not been correctly included. One example is the B-type main-sequence pulsators that simultaneously exhibit both pressure and buoyancy (gravity) modes. So far, none of pulsational models can account for these hybrid pulsations. Likewise, the recent laboratory measurements at solar interior temperatures indicate that the predicted Rosseland mean opacities for iron are underestimated by about 75%.

In this talk, I will present what constraints on opacities we have obtained from the analysis of stellar pulsations. This analysis consists of construction of seismic models which reproduce the observed frequencies extracted from the light curve as well as other pulsational observables. Stellar seismology, i.e., *asteroseismology*, is a relatively young branch of astrophysics and, currently, provides the most accurate test of the theory of internal structure and evolution.

We have shown that opacities under stellar conditions are underestimated at the depth of temperatures T=160000-300000 K, what can indicate that the currently used atom models are not entirely correct. The opacity data are important for all branches of astrophysics and their revision is vital. Our research is an independent test of these microphysics data.

Serdecznie zapraszam,
Agnieszka Majczyna