
Entropy-calibrated stellar modeling: Improving the use of prescriptions

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Abstract

The modeling of convection is a longstanding problem in stellar physics. Up-to-now, all ad hoc models rely on a free parameter α which has no real physical justification and is therefore poorly constrained. However, a link exists between this free parameter and the entropy of the stellar adiabat. Prescriptions, derived from 3D stellar atmospheric models, are available that provide entropy as a function of the global stellar parameters. This enabled us to constrain α through the development of entropy-calibrated models. Several questions arise as these models are increasingly used. Which prescription should be used? Should they be used in their current form? How do uncertainties impact entropy-calibrated models? In this poster, we present how the entropy-calibration method is implemented into the stellar evolution code `Cesam2k20`, we give recommendations on the use of prescriptions and we show comparisons with the Sun and the alpha Cen system. In addition, we used data from the CIFIST grid of 3D atmosphere models to evaluate the accuracy of the prescriptions.

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