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Simulations of stellar atmospheres and spectra of the future

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New spectrographs like HRMOS hold great promise to provide high-precision abundance measurements through high-resolution spectra of dozens of stars at a time. However, the chemical composition of stars cannot be directly measured from their spectra, but must be estimated through comparisons to theoretical radiative transfer calculations. At present, shortcomings in this theory are holding back the progress of new instrumentation.
Two approximations are common in the study of FGK-type stars: the use of one-dimensional (1D) hydrostatic model atmospheres, and local thermodynamic equilibrium (LTE). Both assumptions can lead to significant inaccuracies, especially at low metallicity and in giant stars. Each approximation can be tackled separately, and grids of 1D non-LTE or 3D LTE spectra have become available in recent years. However, the effects do not "stack", and the combined 3D non-LTE problem is in most cases prohibitively expensive. I will present recent progress and plans for future grids of cutting-edge 3D model atmospheres and 3D non-LTE synthetic spectra for elements of key astrophysical importance including iron.

Type

invited talk

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