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Neon to the rescue of the solar interior models? Insights from the analysis of nearby B stars

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The recent downward revision of the abundances of most metals in the Sun leads to large discrepancies between the theoretical predictions for the internal structure of the Sun and the helioseismic data (sound speed and density profiles in the interior, properties of the convective zone). Changes in the input physics of the standard solar models (opacity tables, treatment of diffusion, etc.) have so far failed to restore the past agreement.

Neon is an important contributor to the opacities in the solar radiative zone and it has been proposed that this problem arises from a severe underestimation of the abundance of this element. It is unfortunately difficult to test the validity of this hypothesis, as the Ne abundance can only be indirectly estimated from observations of the solar corona and is therefore highly uncertain.

However, an alternative approach to constrain the Ne content of the Sun is offered by nearby hot stars, as they are the only stellar objects whose neon abundance can be estimated from the direct analysis of photospheric lines. After a description of the problems posed by the new solar abundances and a brief review of the solutions proposed to solve them, I will present a project aimed at determining the neon abundance in a sample of B stars in the solar neighbourhood. The relevance of neon as a solution to the solar problem will be discussed in the light of our results.

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