

The Gaia-ESO Survey: CNO abundances in open clusters of our Galaxy

A. Drazdauskas¹, G. Tautvaišienė¹, Š. Mikolaitis^{1, 2}, G. Barisevičius¹, E. Puzeras¹, E. Stonkute¹, Y. Chorniy¹ and GES collaborators

¹*Institute of Theoretical Physics and Astronomy, Vilnius University, A. Goštauto 12, LT-01108 Vilnius, Lithuania*

²*Laboratoire Lagrange (UMR7293), Université de Nice Sophia Antipolis, CNRS, Observatoire de la Côte d'Azur, CS 34229, F-06304 Nice cedex 4, France*

Abstract

Up to 80 open clusters will be observed in the Gaia-ESO survey with the high-resolution FLAMES-UVES spectrograph on the ESO VLT telescope. We aim to determine C, N and O abundances in stars of Galactic open clusters of the Gaia-ESO survey and to compare the observed abundances with those predicted by current stellar and Galactic evolution models.

In this work, we present investigations of CNO abundances in the open clusters Trumpler 20 (Tr 20), NGC 4815, and NGC 6705 (M 11), which were observed during the first six months of the GES survey. The spectra were analysed using a differential model atmosphere method. Abundances of carbon were derived using the C₂ band heads at 5135 and 5635.5 Å. The wavelength interval 6470–6490 Å, with CN features, was analysed in order to determine nitrogen abundances. Oxygen abundances were determined from the [O I] line at 6300 Å.

The CNO abundances in Trumpler 20 were determined for 42 stars, for five giants in NGC 4815, and for 27 giants in NGC 6705. The C/N ratios of stars in the investigated open clusters were compared with the ratios predicted by stellar evolutionary models. For the corresponding stellar turn-off masses from 1.9 to 3.3 M_{\odot} , the observed C/N ratio values are very close to the predictions of standard first dredge-up models as well as to models of thermohaline extra-mixing. They are not decreased as much as predicted by the recent model in which the thermohaline- and rotation-induced extra-mixing act together.

The first results of CNO determinations in open clusters show the potential of the Gaia-ESO Survey to judge stellar and Galactic chemical evolution models and the validity of their physical assumptions through a homogeneous and detailed spectral analysis.