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Do stellar and nebular abundances in the Cocoon nebula agree?

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Abstract

The Cocoon nebula is an apparently spherical Galactic HII region ionized by a single star (BD+46 3474). This nebula seems to be appropriate to investigate the chemical behavior of oxygen and other heavy elements from two different points of view: a detailed analysis of the chemical content of the ionized gas through nebular spectrophotometry and a detailed spectroscopic analysis of the spectrum of the ionizing star using the state-of-the-art stellar atmosphere modelling. In this poster we present the results from a set of high-quality observations, from 2m-4m class telescopes, including the optical spectrum of the ionizing star BD+46 3474, along with long-slit spatially resolved spectroscopy of the nebula. We have used state-of-the-art stellar atmosphere codes to determine stellar parameters and the chemical content of several heavy elements. Traditional nebular techniques along with updated atomic data have been used to compute gaseous abundances of O, N and S in the Cocoon nebula. Thanks to the low ionization degree of the nebula, we could determine total abundances directly from observable ions (no ionization correction factors were needed) for three of the analyzed elements (O, S, and N). The derived stellar and nebular abundances are compared and the influence of the possible presence of the so-called temperature fluctuations on the nebula is discussed.

The results of this study are presented in more detail in García-Rojas, Simón-Díaz & Esteban 2014, A&A, 571, A93.