

PHOTOIONIZED NEBULAE IN THE LOCAL GROUP: NUCLEOSYNTHESIS AND CHEMICAL EVOLUTION

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Photoionized nebulae, comprising HII regions and planetary nebulae (PN), are excellent laboratories to study the nucleosynthesis and chemical evolution of several elements in the Galaxy and in other galaxies. While HII regions reflect basically the present interstellar abundances of elements such as oxygen, sulphur, neon, etc., planetary nebulae display the original composition at the time their progenitor stars were formed. On the other hand, the abundances of elements such as helium and nitrogen are affected by the evolution of the PN progenitor stars, so that a direct comparison of the abundances of these elements in photoionized nebulae gives important clues on the nucleosynthesis and chemical evolution processes of their host galaxies.

There is presently a very large quantity of data on photoionized nebula for several galaxies in the Local Group, both regarding HII regions and PN. In particular, our group has obtained one of the largest samples of accurately measured abundances of PN in several regions of the Milky Way and the Magellanic Clouds, which can be supplemented by data from other surveys of Local Group galaxies in order to derive a statistically significant sample.

In this work we investigate the main distance independent correlations involving the elements He, N, O, Ne, S, and Ar in photoionized nebulae located in Local Group galaxies. It is shown that most of these correlations hold for all the objects in the Local Group, indicating that similar chemical evolution processes have occurred in these objects. These correlations can also be compared with predictions of theoretical models both for intermediate and large mass stars, so that some implications can be derived for the nucleosynthesis processes in these stars.