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Determination of metallicity in Seyfert galaxies

During the last decades the work involving objects known as *Active Galactic Nuclei* (AGNs) has been gaining more and more attention from several authors aiming at improving the already acquired knowledge. This knowledge provide us with the understanding of the physical processes occurring in AGNs as well as with a better mapping of the Universe. The initial proposal of the thesis project started from the fact of exploring the values available in the literature for AGNs, of the metallicity (Z) and the ionization parameter (U) taking the values from the emission line intensities observed in the infrared, optical and ultraviolet spectra. We compared the literature values with predictions from a grid of photoionization models computed with CLOUDY code. When we started doing this investigation, only three (theoretical) calibrations relating the emission line intensites with the models were available in the literature, one in the ultraviolet region and two in the optical region. Among the AGNs types, the so-called Seyfert galaxies were chosen for this analysis. The ($Z - N2O2$) calibration ($N2O2 = \log([NII]\lambda6584/[OII]\lambda3727)$) in the optical was obtained for about 60 objects. For this region of the electromagnetic spectrum, the calibration for the selected AGNs covers a wide range of metallicities ($0.30 \leq Z/Z_\odot \leq 2.00$), with an average value of $< Z > \approx Z_\odot$. For the ultravioleta, the $Z - C43$ calibration ($C43 = \log[(CIV\lambda1549 + CIII]\lambda1909)/HeII\lambda1640]$) was derived for a sample of about 10 objects. In this case, the calibration covers a narrower range in metallicities ($1.00 \leq Z/Z_\odot \leq 1.75$), with an average value of $< Z > \approx 1.4Z_\odot$. It is worth noticing that the interpolation on the grids ($CLOUDY$ code) was perfomed through the so-called "diagnostic diagrams". Comparing the values of the emission line intensities of the galaxies with those from the grids, and the same way, the values of the ionization parameters were be obtained. We define with this work new metallicity calibrations (semi-empirical) for a sample of Seyfert galaxies. This opens possibilities for estimating the metallicity values of other objects (AGNs) and comparing them with the value of some of their physical proprieties.

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