Highlights of Spanish Astrophysics XI, Proceedings of the XV Scientific Meeting of the Spanish Astronomical Society held on September 4–9, 2022, in La Laguna, Spain. M. Manteiga, L. Bellot, P. Benavidez, A. de Lorenzo-Cáceres, M. A. Fuente, M. J. Martínez, M. Vázquez- Acosta, C. Dafonte (eds.), 2023

What can we learn from constraining Extreme-Emission Line Galaxies models with large samples of local analogs?.

Enrique Pérez-Montero[1], Ricardo Amorín[2,3], José M. Vílchez[1], Jorge Sánchez Almeida[4,5], Rubén García-Benito[1], and Carolina Kehrig[1]

[1] Instituto de Astrofísica de Andalucía. CSIC. Apartado de correos 3004. 18080, Granada, Spain
[2]Instituto de Investigación Multidisciplinar en Ciencia y Tecnología, Universidad de La Serena, Raul Bitrán 1305, La Serena, Chile
[3]Departamento de Astronomía, Universidad de La Serena, Av. Juan Cisternas 1200 Norte, La Serena, Chile
[4]Instituto de Astrofísica de Canarias. C/ Vía Lactea s/n. La Laguna, Tenerife, Spain
[5] Departamento de Astrofísica, Universidad de La Laguna, Tenerife, Spain

Abstract

Extreme Emission Line Galaxies (EELGs) are characterized by their compact sizes and very high equivalent widths of certain optical emission lines (e.g. EW([OIII]) > 500Å), indicative of very high specific star formation rates, similar to those detected in the reionization epoch galaxies. Many of them also present certain high-excitation emission-lines, such as HeII at λ 4686Å, indicative of a very hard incident stellar radiation.
We compiled from the Sloan Digital Sky Survey (SDSS) the largest (around 2000) sample of EELGs using an automatic algorithm and we studied their physical properties and chemical abundances from the direct method. This allowed us to study the fundamental relations followed by this type of galaxies (e.g MZR, O/H vs N/O). This observational feedback can be used to constrain photoionization models from which we can provide model-based solutions to derive the properties of the high-redshift galaxies using only their available observed strong emission-lines.
Among the model-based solutions that benefit from this constrains and can be subsequently applied to high-redshift EELGs it is the HII-CHI-MISTRY code. We show that this code can be adapted to give specific solutions to derive e.g. chemical abundances and to interpret the softness diagram involving the nebular HeII emission. The latter can be used to quantify the hardness of ionizing incident spectral energy distribution and the fraction of leaking photons.

My poster is available at https://zenodo.org/record/7034458#.Y1oq8i8l03U