Contribution ID: **26** Type: **Oral Contribution**

Effects of multiple spiral arm patterns on O, Eu, Fe, and Ba abundance gradients

Thursday 12 June 2025 18:10 (20 minutes)

According to observations and numerical simulations, the Milky Way could exhibit several spiral arm modes with multiple pattern speeds,
wherein the slower patterns are located at larger Galactocentric distances. Our aim is to quantify the effects of the spiral arms on the azimuthal variations of the chemical abundances for oxygen, iron and for the first time for neutron-capture elements (europium and barium) in the Galactic disc. We assume a model based on multiple spiral arm modes with different pattern speeds.
We apply new analytical prescriptions for the spiral arms in a 2D Galactic disc chemical evolution model, exploring the possibility that the spiral structure is formed by the overlap of chunks with different pattern speeds and spatial extent. The predicted azimuthal variations in abundance gradients are dependent on the considered chemical element. Elements synthesised on short time scales (i.e., oxygen and europium in this study) exhibit larger abundance fluctuations. In fact, for progenitors with short lifetimes, the chemical elements restored into the ISM perfectly trace the star formation perturbed by the passage of the spiral arms. The map of the star formation rate predicted by our chemical evolution model with multiple patterns of spiral arms presents arcs and arms compatible with those revealed by multiple tracers (young upper main sequence stars, Cepheids, and distribution of stars with low radial actions). Finally, our model predictions are in good agreement with the azimuthal variations that emerged from the analysis of Gaia DR3 GSP-Spec [M/H] abundance ratios, if at most recent times the pattern speeds match the Galactic rotational curve at all radii.

Author: SPITONI, Emanuele (Istituto Nazionale di Astrofisica (INAF), Osservatorio Astronomico di Trieste)

Presenter: SPITONI, Emanuele (Istituto Nazionale di Astrofisica (INAF), Osservatorio Astronomico di Trieste)