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

Supernova rates and [α/Fe] abundances in Milky Way Galaxy: their variations in time and space.

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Abstract

We present an update of the MulChem chemical evolution model applied to the Milky Way Galaxy (Molla et al. submitted), by using the most recent stellar yields for low and intermediate mass stars and for massive stars. We study the role of the type Ia supernova (SN Ia) rate, using 15 different Delay Time Distribution (DTD) prescriptions, depending on the binary star scenario able to create a SN Ia. Simultaneously, 12 tables of yields of elements produced by different explosion mechanisms for SN Ia are explored. The chemical abundances derived from these 180 models, resulting from the combination of different SN Ia yields and DTDs, are analized. The Solar Region results for [Fe/H] and [α/Fe] *vs.* stellar age and for [α/Fe] *vs.* [Fe/H] (where α-elements are O, Mg, Si, S, and Ca) are compared with an extensive observational dataset coming from the most recent surveys and compiled for this work. A χ^2 technique is used to look for the best model for reproducing the data set. Finally, we analyse the relative abundances [α/Fe] for disc and halo regions of the best model. As in previous works, we find that a significant fraction of type Ia SNe must take place at short delay times in order to reproduce the observations. The large dispersion of data could be explained by a mix of stars located at different spatial regions that moved after their birth. However, a mix of different DTD's or explosion mechanisms is a likely hypothesis in light of comparison models-data.

My poster is available at https://zenodo.org/record/7015711#.Y1bbgIJBxmE