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CHEMICAL AND MORPHOLOGICAL ANALYSIS OF SIMULATED GALAXIES

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We present preliminary results of a study of the abundance and age gradients of disc and spheroid components in galaxies selected from hydrodynamical cosmological simulations consistent with the concordance Λ-CDM models. Our simulated abundance and age gradients are in agreement with observations at $z = 0$. Abundance gradients for disc components are found to be steeper at higher redshifts.

In this work we present preliminary results from a study of the chemical properties of disc galaxies. The main difference with previous works is that we are able to follow the chemical enrichment of baryons as galaxies are formed in a cosmological context. The origin and evolution of the abundance gradients of Spiral Galaxies have been widely studied by different works with a variety of approaches (e.g. Chiappini et al. 1997; Colavitti et al. 2008).

We analysed hydrodynamical cosmological simulations consistent with the concordance ΛCDM universe with $\Omega_{\rm m} = 0.3$, $\Omega_\Lambda = 0.7$, $\Omega_{\rm b} = 0.04$ and $\mathrm{H}_0 = 100\ h^{-1}$ km s^{-1} Mpc^{-1} with $h = 0.7$. These simulations were run by using a version of GADGET-3 (Scannapieco et al. 2008), which includes treatments for metal-dependent radiative cooling, stochastic star formation, chemical and energetic Supernovae feedback. For each simulated galaxy, we defined the spheroidal and disc components and estimated the O/H gradients for each of them as well as their age gradients.

Our simulations showed that discs formed in an inside-out fashion defining a nice age profiles (e.g. Scannapieco et al. 2009; Colavitti et al. 2009) while the central stellar spheroids are dominated by old stellar populations. We analysed the gradients of the simulated galaxies at different redshifts finding that disc components defined steeper relations at higher redshifts on average. In a forthcoming paper we will discuss these results in detail and in relation to the formation histories of the simulated galaxies.

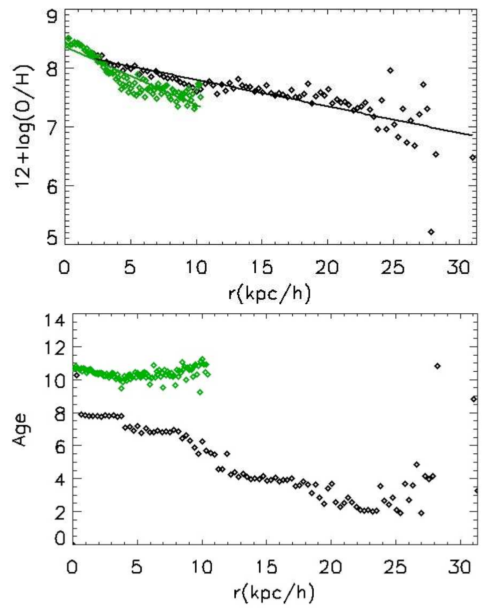

Fig. 1. Upper panel: Stellar abundance gradients for the disk (black symbols) and central spheroid (green symbols) components. The continuous line: linear fit; lower panel: Mean age of the disc (black) and central spheroid (green) components.

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