A NEW DETERMINATION OF THE PRIMORDIAL HELIUM ABUNDANCE

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We present new Y values for five H II regions, from these values we determine the primordial helium abundance, Y_P, and obtain that $Y_P = 0.2446 \pm 0.0029$, (Peimbert, A. et al. 2016, RMxAA, 52, 419). The main difference of our new value with the Y_P value by Peimbert, M. et al. (2007, ApJ, 666, 633) is due to the use of updated atomic physics parameters.

Our Y_P value is consistent with that by Aver, E. et al. (2015, JCAP, 7, 11), that amounts to $Y_P = 0.2449 \pm 0.0040$, but in disagreement by more than 3σ with that by Izotov, Y. I. et al. (2014, MNRAS, 443, 778), that amounts to $Y_P = 0.2551 \pm 0.0022$.

Y_P together with Big Bang Nucleosynthesis, BBN, can be used to put constraints on the number of neutrino families, N_ν, and the neutron mean life, τ_n.

The adoption of a neutron mean life of $\tau_n = 880.3 \pm 1.1$(s) (Olive, K. A et al. 2014, Chinese Physics C, 38, 090001) and our Y_P value imply that $N_{eff} = 2.90 \pm 0.22$, consistent with 3 neutrino families but not with 4 neutrino families.

The adoption of $N_{eff} = 3.046$ (Mangano, G. and Serpico, P. D. 2011, PhLB, 701, 296) and our Y_P value imply that $\tau_n = 872 \pm 14$(s), consistent with both high and low values of τ_n in the literature.

An increase on the quality of the Y_P determination from H II regions will provide stronger constraints on the N_ν and τ_n values.

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COMPARING MODELS OF STAR FORMATION SIMULATING OBSERVED INTERACTING GALAXIES

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In this work, we make a comparison between different models of star formation to reproduce observed interacting galaxies. We use observational data to model the evolution of a pair of galaxies undergoing a minor merger. Minor mergers represent situations weakly deviated from the equilibrium configuration but significant changes in star fomation (SF) efficiency can take place, then, minor mergers provide an unique scene to study SF in galaxies in a realistic but yet simple way. Reproducing observed systems also give us the opportunity to compare the results of the simulations with observations, which at the end can be used as probes to characterize the models of SF implemented in the comparison.

In this work we compare two different star formation recipes implemented in Gadget3 and GIZMO codes. Both codes share the same numerical background, and differences arise mainly in the star formation recipe they use. We use observations from Pico dos Días and GEMINI telescopes and show how we use observational data of the interacting pair in AM2229-735 to characterize the interacting pair. Later we use this information to simulate the evolution of the system to finally reproduce the observations: Mass distribution, morphology and main features of the merger-induced star formation burst. We show that both methods manage to reproduce roughly the star formation activity. We show, through a careful study, that resolution plays a major role in the reproducibility of the system. In that sense, star formation recipe implemented in GIZMO code has shown a more robust performance.

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