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MASS SEGREGATION OF YOUNG STAR CLUSTERS

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Mass segregation of the young star cluster is one of the dynamical properties which is an important tool to investigate the star forming process and dynamical evolution of star clusters. The origin of this mass segregation has been suggested as either primordial, that is, it is a result of the star formation process in which stars form mass segregated from their parent molecular cloud, or dynamical, i.e., resulting from fast dynamical evolution. Recent N-body simulations suggest initially dynamically cool and sub-structured star clusters can be mass segregated within very short timescale. We investigate the influence of different initial parameters to further constrain our theoretical model for young-mass segregated star clusters. In particular, we focus on the correlation between the morphology and the degree of mass segregation of the early evolution of young star clusters. We find that young star clusters cannot be highly mass segregated while they are still fractal. Therefore, we conclude that mass segregation of young star clusters is unlikely to be purely dynamical.

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GALAXIES

STELLAR FEEDBACK FROM BLACK-HOLE HIGH-MASS X-RAY BINARIES IN GALAXY FORMATION MODELS

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In recent years, many works have suggested the role of black-hole high-mass X-ray binaries (BH-HMXB) as potential sources of heating and re-ionization in the interstellar and intergalactic medium. Furthermore, because of the suggested increase of their production rate and X-ray luminosity with decreasing metallicity, BH-HMXBs could be relevant to explain the thermal and ionization history of the Universe at its early stages. As observations indicate, a meaningful amount of the energy released by these sources could be deposited in the local interstellar medium, suggesting that BH-HMXB could modify star forming regions on the host galaxy. In this work, we study the kinetic BH-HMXB feedback using hydrodynamical cosmological simulations which also include SNe feedback. Our preliminary results suggest that BH-HMBXs feedback is not efficient at modifying the star formation activity. However, due the complexity of the problem and the wide dynamical range needed to describe properly different physical events, there are still different schemes to explore. In the future, we will study the role of BH-HMXBs in high numerical resolution simulations at high redshifts, and how the energy is released into the interstellar medium.

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THE LMC OUTER DISK STELLAR POPULATION IN THE LIGHT OF THE DARK ENERGY SURVEY

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The outermost regions of the Large Magellanic Clouds (LMC) have recently been covered by Dark Energy Camera (DECam) Science Verification data, in preparation for the Dark Energy Survey (DES). Although the DES footprint misses the bar and main star forming regions of the LMC, the available data sample a large and continuous area of the LMC disk down to $r \simeq 24$ at distances greater than 5 degrees from its center. This large surveyed region opened the possibility to study the outer LMC star formation history (SFH) with unprecedented detail. In this work we employ the partial models method (Gallart et al 1999; Javiel et al 2005) to recover the SFH and its spatial variations in the outskirts of the LMC from the observed colour-magnitude diagrams. We take the MW foreground stars into account by modelling them with TRILEGAL (Girardi et al. 2005). With this technique we were able to recover the spatial dependency of the LMC outer components SFH and estimate its extension as well as the inclination and depth of the LMC disk. As a byproduct of our

analysis we assembled a catalog of new LMC stellar clusters.

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GALAXIES AT HIGH REDSHIFT

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Recent years have seen tremendous progress in finding and charactering star-forming galaxies at high redshifts across the electromagnetic spectrum, giving us a more complete picture of how galaxies evolve, both in terms of their stellar and gas content, as well as the growth of their central supermassive black holes. A wealth of studies now demonstrate that star formation peaked at roughly half the age of the Universe and drops precariously as we look back to very early times, and that their central monsters apparently growth with them. At the highest-redshifts, we are pushing the boundaries via deep surveys at optical, X-ray, radio wavelengths, and more recently using gamma-ray bursts. I will review some of our accomplishments and failures.

Telescope have enabled Lyman break galaxies to be robustly identified, but the UV luminosity function and star formation rate density of this population at $z = 6 - 8$ seems to be much lower than at $z = 2 - 4$. High escape fractions and a large contribution from faint galaxies below our current detection limits would be required for star-forming galaxies to reionize the Universe. We have also found that these galaxies have blue rest-frame UV colours, which might indicate lower dust extinction at $z > 5$. There has been some spectroscopic confirmation of these Lyman break galaxies through Lyman-α emission, but the fraction of galaxies where we see this line drops at $z > 7$, perhaps due to the onset of the Gunn-Peterson effect (where the IGM is opaque to Lyman-α).

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METAL-POOR ACTIVE GALACTIC NUCLEI

I. C. Bicalho[1] and E. Telles[1]

Active galaxies are considered to be metal-rich, with metallicity ranging from solar to slightly supersolar. This is due to the fact that the active galaxy nuclei are usually found in supermassive galaxies. We aim to test this statement by obtaining near infrared spectra of peculiar dwarf galaxies to see if they host an AGN. We present the results based on analysis of data from Gemini Near Infrared Integral Field Spectrograph (NIFS) of the metal-poor HII galaxy SDSS J1047+0739 ($12 + \log$ O/H $\sim 7.85 \pm 0.02$). The spectrum of this galaxy shows strong permitted emission lines with extended wings, which is atypical for HII regions. We use unconventional methods such as PCA tomography due to the benefits that it provides to data cube analysis. We are studying the kinematics of the nuclear region and the regions of star formation surrounding it, mostly through the Paschen-α and He lines. We find that the broad line emission comes only from the unresolved central region. The results of this analysis agree well with the existence of an AGN in this metal-poor galaxy.

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ANALYSIS OF THE VELOCITY DATA OF CLUSTER A562

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We present a recent study of the dynamics of the cluster of galaxies Abell 562 intended to determine if ram pressure is responsible for the jet bending in the Wide-Angle Tailed (WAT) radio source located in the central elliptical galaxy. Given the properties of the jet and of the intra-cluster medium (ICM), a relative velocity between the galaxy and the ICM greater than 800 km/s is needed for this mechanism to bend the WAT jet. We find that the peculiar velocity of the WAT galaxy is 170±140 km/s which is not enough to produce the bending. This is based on the analysis of the velocity of 146 galaxy cluster members obtained with the Gemini Multi-Object Spectrometer (GMOS) at Gemini North. However, our analysis of these velocity data and archival Chandra data suggests that an off-axis merger occurred in this system. This type of merger typically produces bulk flow motions with peak velocities greater than 1000 km/s which should be enough to explain the bending of the jets.

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