signatures, such as the nebular emission of atomic species like [NeII] and [NeIII], and the H_2 temperatures we also relate the global pattern of star formation in Starburst galaxies with the internal physics of the ISM.

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DISK MASS-TO-LIGHT RATIO THROUGH STELLAR POPULATION SYNTHESIS: DARK MATTER CONTENT OF NGC 5278

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We extended the study on the mass distribution of the spiral galaxy NGC 5278, obtaining the 2D mass distribution of the stellar disk of NGC 5278 using broad band photometric observations and stellar population synthesis models. We performed the rotation curve (RC) decomposition of NGC 5278, subtracting the extracted baryonic disk from the observed RC and fitting only the dark matter RC with four density profiles of dark matter (DM) halos: Hernquist (HH), Burkert (BH), Navarro, Frenk and White (NFW) and Einasto (EH). The main results of this work were that the HH DM halo better fitted the DM RC of NGC 5278 in the case of disk mass $M_d = 5.6 \times 10^{10} M_\odot$ and less 30% of this value, and also that the cored ($n < 4$) EH DM halo better fitted the DM RC of NGC 5278 in the case of more 30% disk mass.

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DETERMINATION OF HALO OCCUPATION DISTRIBUTION

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In this work, we propose a new method to calculate the Halo Occupation Distribution (HOD). It consist of subtract galaxies that are in front or behind the group (background galaxies), but, for projection effects, seem to belong to this. This allows to combine spectroscopic information from catalogs of galaxy groups with photometric information from catalogs of galaxies, the main advantage of this is the possibility to estimate the HOD in more ranges of absolute magnitudes. To evaluate the procedure, we used mock catalogs of galaxies and groups constructed with an imposed HOD. We compare this fiducial HOD with the obtained results by applying our method. Finally, we implement background subtraction in the Sloan Digital Sky Survey DR7, compare to the results of Yang et al. (2008) and calculate the HOD in other ranges of absolute magnitudes.

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THE DENSE GAS IN M82

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Galactic winds are responsible of carrying energy and matter from the inner regions of galaxies to the outer regions, even reaching the intergalactic medium. This process removes gas from the inner regions, the available material to form stars. How and in which amount these winds remove gas from galaxies plays an important role in galaxy evolution. To study this effect we have obtained 3 mm maps of dense gas ($n_{\rm crit} > 10^4$ cm^{-3}) in the central region of the starburst galaxy M82. We detect line emission from the dense molecular gas tracers HCN, HCO^+, HNC, CS, HC_3N and C_6H. Our maps reveal a considerable amount of HCO^+ emission extending above and bellow the central star-forming disk, indicating that the dense gas is entangled in the outflow. The mass of molecular Hydrogen outside the central starburst is $M_{\rm out} \approx 3 \pm 1 \times 10^6$ M$_\odot$, while in the central starburst is $M_{\rm disk} \approx 8 \pm 2 \times 10^6$ M$_\odot$. These maps also show variations of the amount of dense gas over the starburst disk, revealing that the gas is more concentrated towards the center of the starburst and less towards the edges. It is the average amount of dense gas what drives the observed star formation law between dense gas and star formation rate on galactic scales.

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PAH LINES AT HIGH REDSHIFT AS GALAXY EVOLUTION MARKER

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Based in chemodynamical models for galaxy evolution, we studied the formation of PAH lines at high redshifts. The model considers carbon and silicon grains, and also PAH molecules. It distinguishes diffuse ISM the molecular clouds associated to star forming regions. The PAH lines provide a good signature of the evolutionary stage of galaxies, star formation rate, in addition to allowing the assessment the relative importance for of AGN and stellar emission on the output of the galaxy. In particular, the line ratio 11.3/7.7 μm is a good marker of the age of high redshift galaxies. We expected that our calculations provide some benchmarks both for future observations both with ground and satellite instruments. The ages derived in this way for high redshift objects could be used to test dark energy models. In addition to the cosmological applications, the observations of the PAH features could be used to check the charge state of PAHs. Apparently, anions and neutrals are favored over cations.

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THE MASS–METALLICITY–STAR FORMATION RATE RELATION UNDER THE STARLIGHT MICROSCOPE

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The correlation between stellar mass and gas-phase oxygen abundance (M–Z relation) has been known for decades. The slope and scatter of this trend is strongly dependent on galaxy evolution: Chemical enrichment in a galaxy is driven by its star formation history, which in turn depends on its secular evolution and interaction with other galaxies and intergalactic gas. In last couple of years, the M–Z relation has been studied as a function of a third parameter: the recent star formation rate (SFR) as calibrated by the Hα luminosity, which traces stars formed in the last 10 Myr. This mass–metallicity–SFR relation has been reported to be very tight. This result puts strong constraints on galaxy evolution models in low and high redshifts, informing which models of infall and outflow of gas are acceptable. We explore the mass–metallicity–SFR relation in light of the SDSS–STARLIGHT database put together by our group. We find that we recover similar results as the ones reported by authors who use the MPA/JHU catalogue. We also present some preliminary results exploring the mass–metallicity–SFR relation in a more detailed fashion: starlight recovers a galaxy's full star formation history, and not only its recent SFR.

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MAGAL: A NEW TOOL TO ANALYSE GALAXIES PHOTOMETRIC DATA

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On galaxy spectra, one can find mainly two features: emission lines, which tell us about the ionised gas content, and the continuum plus absorption lines, which tell us about the stellar content. They thus allow us to derive gas-phase abundances, the main radiation sources, chemical enrichment and star formation histories. Braad-band photometry, on the other hand, is much more limited and hinders our ability to recover a galaxy's physical properties to such a degree of detail. However, with the recent development of redshift surveys using the technology of ultra-narrow filters ($\approx$ 100 Å), such as ALHAMBRA, J-PAS and DES, it will be invaluable to be able to retrieve information on physical properties of galaxies from photometric data.

Motivated by this data avalanche (which goes up to the petabyte scale), we decided to build our own SED-fitting code: Magnitudes Analyser (MagAl), which has three modules. 1) A template library generation module: generates empirical and theoretical template libraries. 2) Bayesian fitting module: calculates probability distribution functions (PDFs) for given observed and library template data. This is