Stellar Populations as Building Blocks of Galaxies
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Two-dimensional spectroscopy of late-type spirals

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Abstract. We present line-strength maps of a sample of 18 late-type spirals. The data have been taken using SAURON at the WHT. Apart from the maps, we present the central line indices, and estimate the star formation time-scale. In an exponentially declining SFR scenario, we find a trend between the time-scale τ and the velocity dispersion: more massive galaxies show shorter burst durations. This result is in agreement with the analysis of Hα emission in galaxies. A detailed study on these data will be published by Ganda *et al.* (2007).

Keywords. Galaxies: individual (NGC772), galaxies: evolution, galaxies: spiral

1. Introduction

We are carrying out a project on the kinematics and stellar populations in late-type spiral galaxies, objects whose stellar component has not been studied in detail yet, due to their low surface brightness and contamination by dust and gas. We focus on a sample of 18 galaxies (type between Sb and Sd) observed with the integral-field spectrograph SAURON at the WHT on La Palma, that allows us to measure the Lick-indices Hβ, Fe5015 and Mgb on a two-dimensional field of view of (41 × 33) arcsec^2. We present example maps of the indices, the inferred stellar population parameters and star formation history.

2. Stellar populations and star-formation history of late-type spirals

A description of the sample of galaxies, data reduction and the extracted kinematics of stars and gas have been published by Ganda *et al.* (2006). After this, we cleaned the spectra from emission lines and calculated the line-strength indices. In Figure 1 we show the line index maps for NGC772 (Sb). Maps for the whole sample will be presented by Ganda *et al.* (2007).

In Figure 2 (left panel) we plot the central line indices of our galaxies (black dots) in the plane ($H\beta$, MgFe50); we overplot the SSP model grid from Thomas *et al.* (2003) (solid lines) and the E/S0 and Sa samples (respectively, red and green symbols) observed with SAURON and discussed by Kuntschner *et al.* (2006) and Peletier *et al.* (2007). This diagram, that shows ages independently of abundance ratios, confirms that the centres of late-type spirals are in general younger and more metal-poor than E/S0 galaxies. It also shows a smaller spread in age and metallicity, compared to Sa galaxies.

'The star formation history of galaxies is imprinted in their integrated light', Bruzual & Charlot (2003) state. Using tools that they provide online, we calculated the spectral evolution of SSP models for various metallicities and Chabrier IMF, assuming an exponentially declining star formation rate: $\psi(t) = 1M \odot \tau^{-1} \exp(-t/\tau)$, where $\psi(t)$ and τ

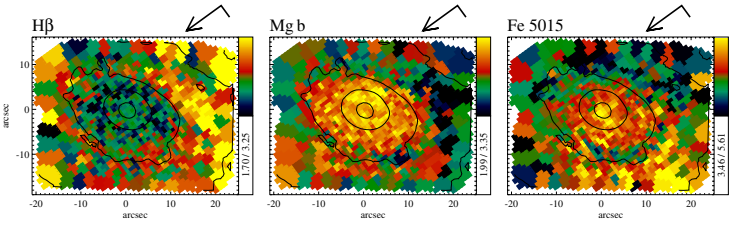

Figure 1. NGC772: maps of the Lick indices Hβ, Mgb and Fe5015 (equivalent widths, in Å) for NGC772. The direction of North and East are indicated by the arrow. Overplotted are the isophotal contours.

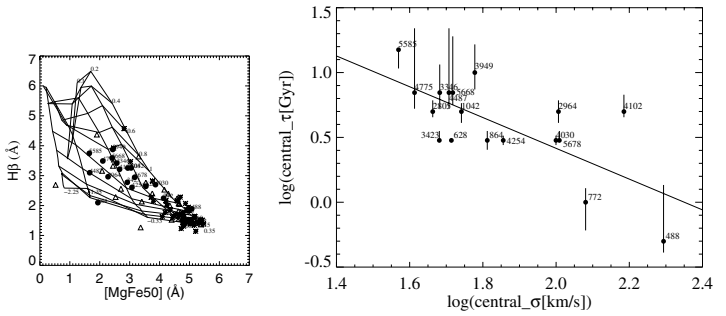

Figure 2. Left panel: Hβ against [MgFe50] ; dots: late-type spirals; asterisks: E/S0; triangles: Sa galaxies (all SAURON data); solid lines: SSP model grid from Thomas *et al.* (2003), with age increasing from top to bottom and metallicity from left to right. Right panel: τ against central velocity dispersion for the 18 late-type spirals, in a log-log scale; overplotted is the best-fitting linear relation.

are the SFR and the e-folding time-scale. τ parametrizes a smooth transition from SSP-like to constant SFR (small $\tau \approx$ SSP, large $\tau \approx$ constant SFR). If we interpret the indices variations as variations in the SFR time-scale, we can get an estimate of τ by comparing our observed line-strength indices with those from the evolved models. In Figure 2 (right panel) we plot τ against velocity dispersion, for age of the evolved models fixed to 10 Gyr, and find a trend: bigger galaxies tend to have shorter SFR time-scales.

3. Conclusions

We have presented line-strength maps for late-type spirals and estimated the time-scale of star formation. We have found that larger galaxies can be approximated with SSPs better than smaller ones. We have also compared their stellar populations with those of earlier types: late-types are generally younger and more metal-poor.

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