The Dynamics of Emission Line Galaxies from new Fabry-Perot Observations.

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Abstract

Intense star formation (SF) and starbursts (SBs) manifest themselves in emission line spectra. Although merging and interactions are widely accepted as a trigger for SBs, it is still unclear to what extent these factors play a role and what other aspects are important. Measuring the internal motions in galaxies can in combination with other diagnostics contribute to our understanding of SB triggers.

We present here new observations of a complete sample of emission line galaxies, using the H-alpha emission line to determine the internal dynamics of the targets. Masses are estimated, assuming Keplerian motions.

The Data

The sample of galaxies that is presented here is a volume limited sub-sample of the emission line galaxies from \cite{SalzerMcAlpine}, taken from the University of Michigan (UM) survey. It contains all galaxies in a certain range of right ascension and declination, up to a certain redshift. In this case the limiting recession velocity is 2500 km/s. This results in a sample of 20 galaxies that is dominated by high excitation objects with blue colours, out of which 18 are presented here. Apart from the two giant spiral galaxies, the absolute B magnitudes (M_{B}) range from -13 to -16.5, thereby adding the low luminosity end to our previous investigations of luminous Blue Compact Galaxies (BCGs). The data were taken at the ESO 3.6m telescope in April 2004 with the CIGALE Fabry-Perot interferometer.

In the panels at the right hand side, the galaxies are ordered in decreasing luminosity and for each galaxy four panels are shown: a continuum image (near the H-alpha line), the monochromatic flux of the H-alpha line, a map of the the line of sight velocity (the velocity field) and a position-velocity (PV) diagram, derived along the axis indicated in the velocity field.

Dynamical Masses

To obtain a rough estimate of the dynamical mass of each object, a very simple approach is chosen. Plugging in half of the maximal difference in velocity and half of the spatial difference that lie between the velocity points chosen into Kepler's law, \( M(<R) = v^2 R / G \).

Since it is difficult to choose an inclination for many of the objects, no correction for inclination has been applied and therefore all masses have to be treated as lower limits. Furthermore, this approach of course neglects all effects that are not Keplerian motion, like infall or outflow of gas, or non-relaxed motions due to interactions or merging. Additionally, a low value of the dynamical mass may simply mean that the system is not rotationally supported. The plot in this panel shows how the derived masses correlate with the absolute B magnitude from \cite{SalzerMcAlpine}.

Future Work

\* Analysis of the H-alpha line shape and width.
\* Modelling the velocity fields.
\* Complementary photometrical observations (broad and narrow band) in the optical and near IR are underway.
\* Comparing the gas motions with the stellar dynamics from Ca II triplet observations. \cite{Ostlin2004}
\* Statistical trends in the whole sample, including the the luminous BCGs. \cite{Marquart2004}

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References:
\[2\] Östlin et al., 2004, A&A 419, L43-L47
\[3\] Marquart et al., 2004 in preparation