

INTEGRAL FIELD SPECTROSCOPY OF SUPERNOVA HOST GALAXIES

L. Galbany^{1,2}, V. Stanishev¹, A. M. Mourão¹, M. Rodrigues^{3,4}, H. Flores⁴, and the CALIFA collaboration

We used optical Integral Field Spectroscopy of nearby supernova (SN) host galaxies to look for correlations in the environmental parameters at the location of different SN types. Our sample consists of 47 galaxies observed by the Calar Alto Legacy Integrated Field Area (CALIFA) Survey, complemented with other 24 previously observed with the same instrument. We updated the analysis tools implemented in our pilot study (Stanishev et al. 2012) to derive stellar population and ionized gas parameters from the 3D datacubes. According to our results SNe Ib/c explode closer to the galactic core and are more associated with HII regions than SNe II. SNe Ia occur on average farther from the center of the galaxy and are associated with regions with lower current star formation and older stellar populations.

The cumulative distributions of the SN galactocentric distances have shown more concentration of SNe Ibc/I Ib compared to the other groups, being SNe Ia in average further from the galactic core. Assuming the presence of metallicity gradients in galaxies, our finding can be understood as differences in the progenitor metallicity. This is in agreement with the models claiming that SNIb/c progenitors have lost their outer layers due to metallicity driven winds. Moreover, we also searched for correlations between the SN type and the distance to the nearest HII clump (aggregation of HII regions). We used HII-explorer (Sánchez et al. 2012) in order to select the HII clumps from the H α emission maps (See an example in Figure 1). Again, the same sequence was found, SN progenitor stars of SNe Ibc/I Ib occurred closer to the star-forming regions than SNI. This can be understood as differences in the progenitor mass, where the SN progenitor stars of those SNe

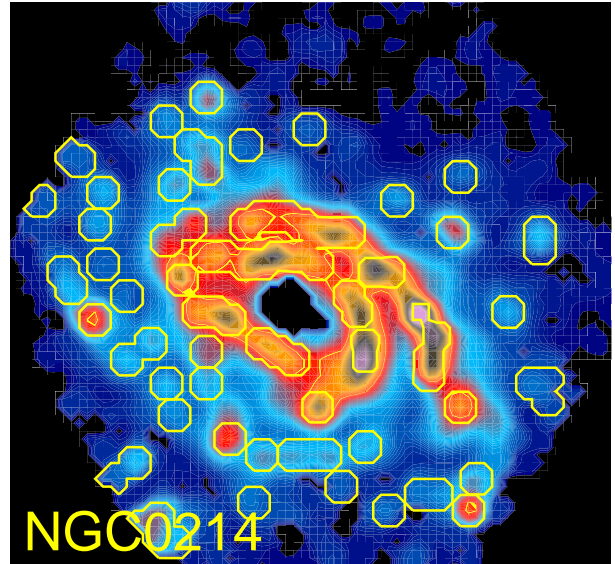


Fig. 1. H α flux map measured from the pure emission spectrum in each pixel within the PPAK field of view for NGC0214. Yellow circles are the H II clumps selected by HII-explorer. Their size is constrained depending on the redshift of the galaxy, never exceeding 1kpc of diameter.

that occurred closer to the star-forming regions have had less time to travel from its birth place therefore losing less amount of mass by interaction or stellar winds. Finally, as a crosscheck, we plotted the distributions of the star-formation rate density, the mean stellar population age, and the H α equivalent width, at the SN position. All these studies agree with young massive stars, tracing the star formation in the galaxies, as being the progenitors of SNe Ibc/I Ib, not so young and less massive progenitors for SNe II, and old stars as SNe Ia progenitors.

We have shown that integral field spectroscopy provides more detailed information about SN hosts than integrated spectroscopy or multicolor imaging. Higher spatial resolution is needed to achieve a better determination of the HII regions and to analyse the star clusters at the SN explosion site.

REFERENCES

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¹CENTRA - Centro Multidisciplinar de Astrofísica, Instituto Superior Técnico, Universidade de Lisboa, Av. Rovisco Pais 1, 1049-001 Lisboa, Portugal.

²Departamento de Astronomía, Universidad de Chile, Casilla 36-D, Santiago, Chile.

³European Southern Observatory, Alonso de Cordova 3107 Casilla 19001 - Vitacura -Santiago, Chile.

⁴GEPI, Observatoire de Paris, UMR 8111, CNRS, Université Paris Diderot, 5 place Jules Janssen, 92190 Meudon, France.