CHARACTERIZATION OF HOST GALAXIES FOR ZTF TRANSIENTS

Javier Correa Orellana

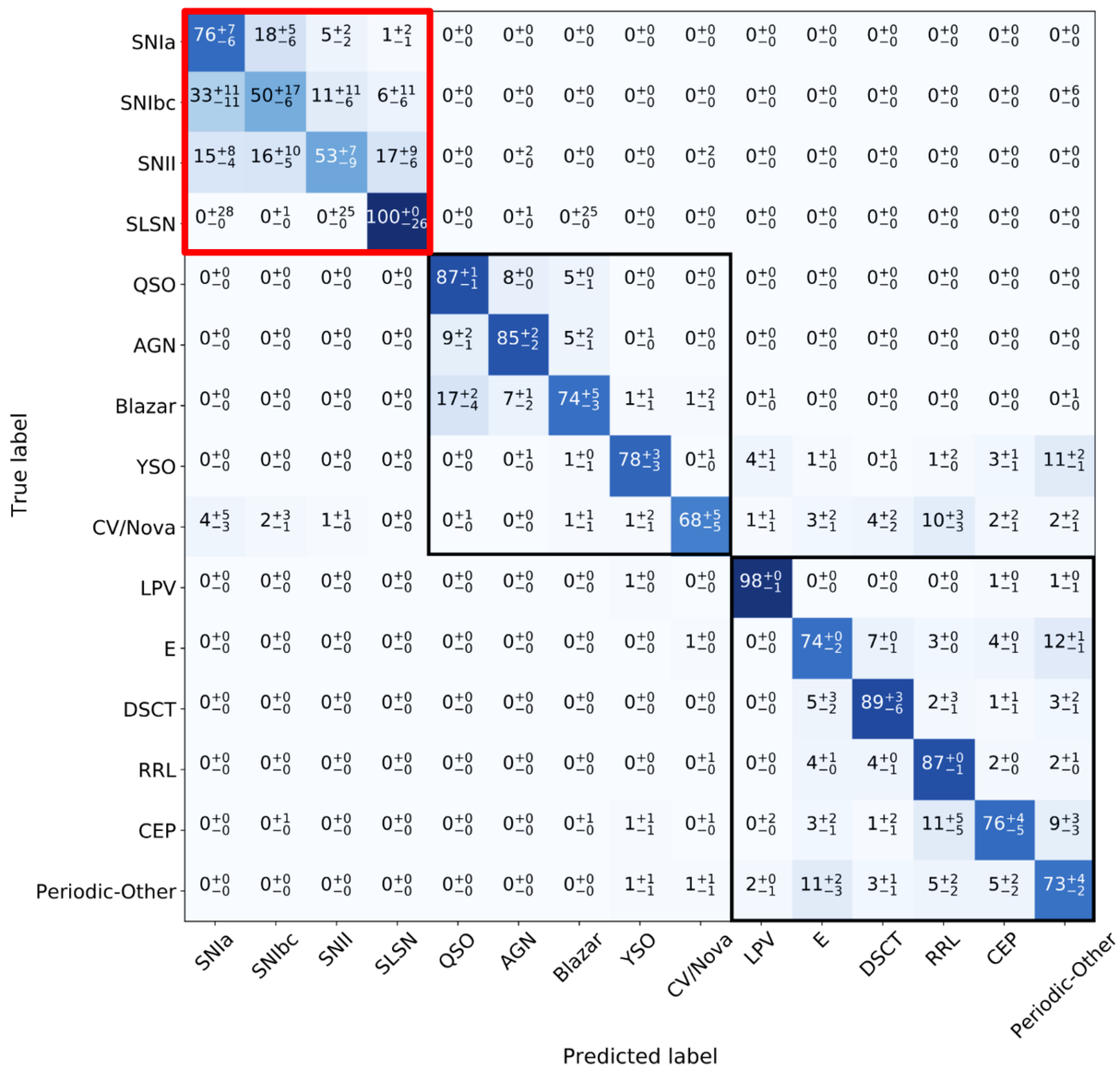
Pontificia Universidad Católica de Chile / Millennium Institute of Astrophysics

Objectives & Research Question:

- Characterize SN hosts using largest sample to date (ZTF-based).
- Test if host features can help improve classification of SN.

Background:

- Host galaxy properties give hints of the population of future SNe progenitors.
- SNe host galaxy properties have proven useful in classifying SNe, despite lacking information of the event itself.
- The ALeRCE broker (Förster+21) has developed a successful LC classifier (Sanchez-Saez+21) using ZTF light curves. However, better distinction among SNe subtypes is needed.

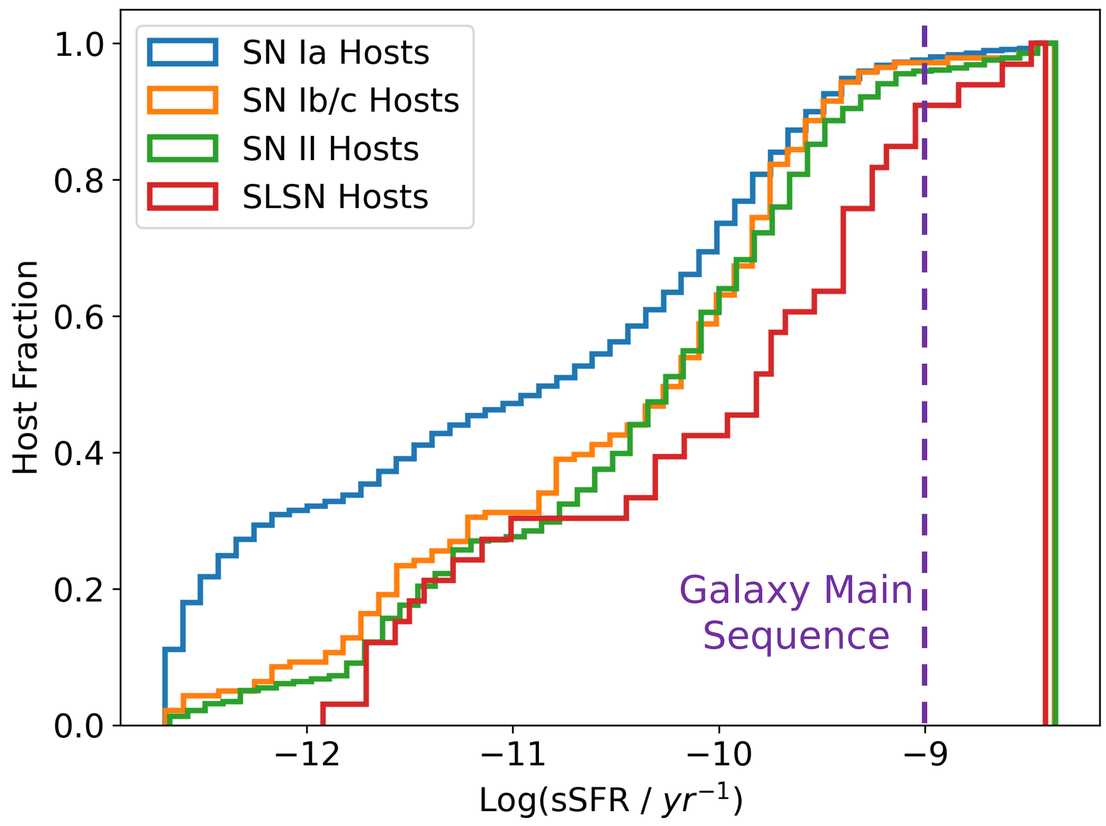


Methodology:

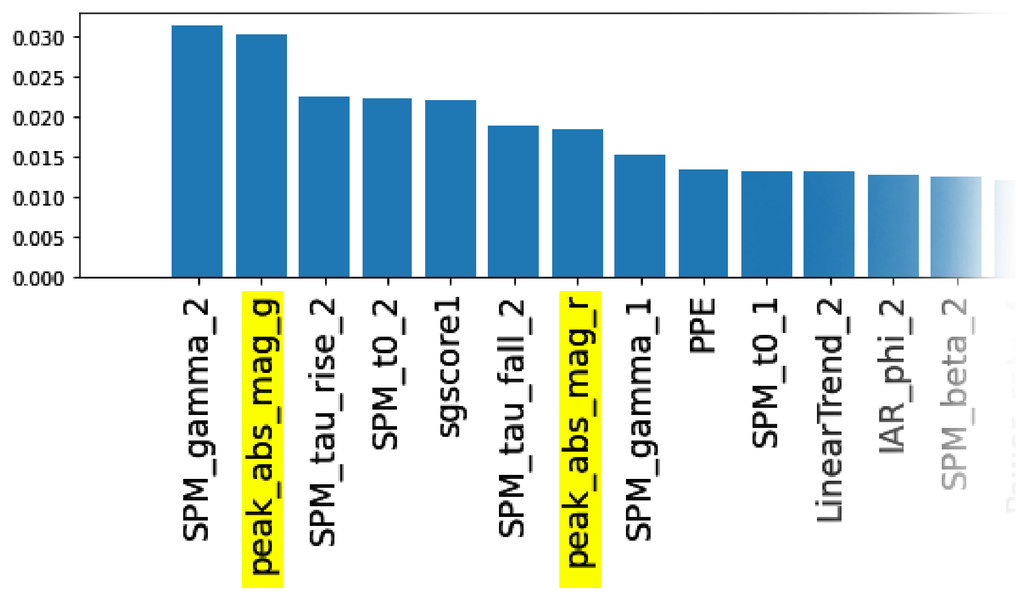
- Select all 5283 spectroscopically classified SNe reported to TNS.
- Associate SN with their host using DELIGHT (Förster, in prep.) and pull their photometry from the Legacy Survey DR9 (Dey+19).
- Find host redshift in the literature (SDSS, PRLS) or using photometry (EAZY, Bagpipes).
- Perform z-fixed SED fitting to derive physical properties from the host (e.g., stellar mass, SFR).
- Compare with previous studies (such as Schulze+21; 888 PTF SNe).
- Add new features to the LC classifier and compare with prior performance.
- Eventually apply to all LC-classified ZTF SNe (6507) to study host statistics.

Preliminary Results:

- Properties derived from SED fits are obtained for all SN hosts.
- Cumulative histograms are made to characterize the distribution of host properties by SN class.



- We ingested this information into a modified LC classifier finding a modest improvement largely due to peak luminosity.



Discussion and Future Work:

- Results are as reliable as the photometry, which is poor in some cases.
- Derived physical properties and relations are broadly consistent with previous works.
- Bigger sample will provide better statistics versus previous studies.
- Peak absolute magnitudes of SNe had high levels of importance, leading to some-what (~5%) improved classification accuracy, while surprisingly other host physical properties did not. Such information about the host might be contained in some LC Classifier training features (e.g. colors).
- In the future, we aim to obtain better photometric redshifts and perform data augmentation to mitigate issues related to an unbalanced training set.

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