

Spectroscopy of Early-Type Host Galaxies of Type Ia Supernovae : the YONSEI Project

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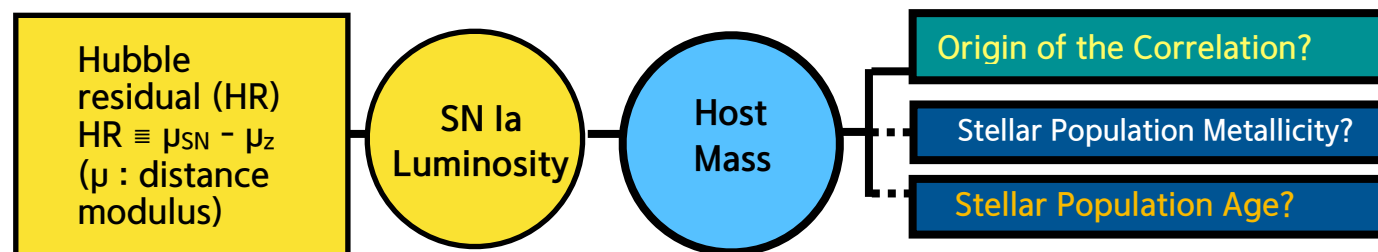
Type Ia Supernova : the Cosmological Standardizable Candle

★ Type Ia supernova (SN Ia)

The most direct evidence for the presence of dark energy

★ The well-known correlation between

the mass of host galaxies and **the Hubble residual of SNe Ia**



★ The YONSEI project

- 1) Our own YONSEI SN Ia catalog (Y.-L. Kim et al., in prep.)
- 2) A **sufficiently large sample of early-type host galaxies** based on high S/N spectra (Y. Kang)

★ Why “early-type” host galaxies?

- For more **reliable population age and metallicities** from the analysis of the absorption lines with evolutionary population synthesis (EPS) models
- No (or little) effect by dust extinction
- Relatively homogenous stellar population

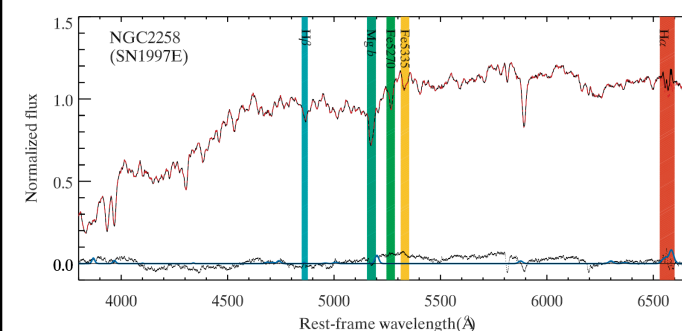
YOnsei Nearby Supernova Evolution Investigation project

Observations

51 early-type host galaxies in YONSEI catalog ($0.01 < z < 0.08$)

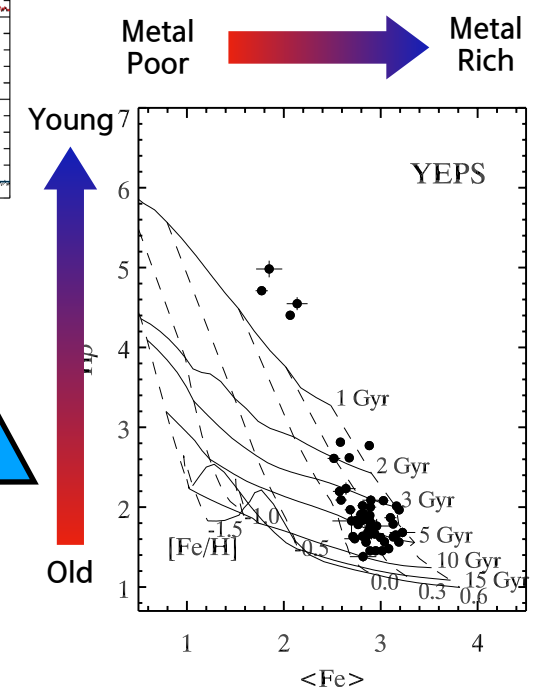
Data Reduction & Analyses

Absorption Line Measurements



Determination for Age & Metallicities of Host Galaxies

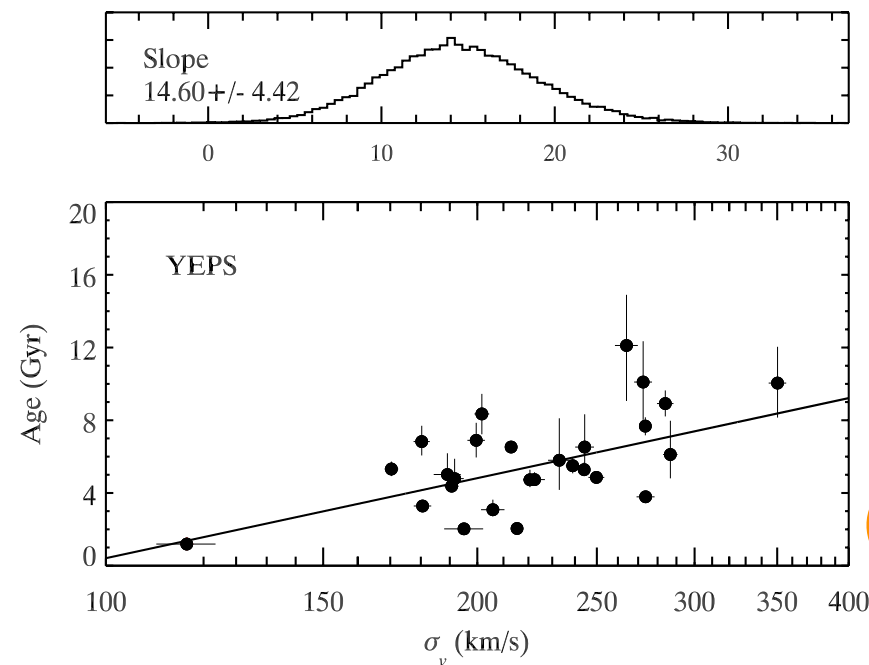
- H β : age
- $\langle \text{Fe} \rangle$: iron abundance
- Mgb : alpha element



Results

I. Mass (σ_v) $\propto$ Age of Hosts

★ “Downsizing” trend among the early-type hosts

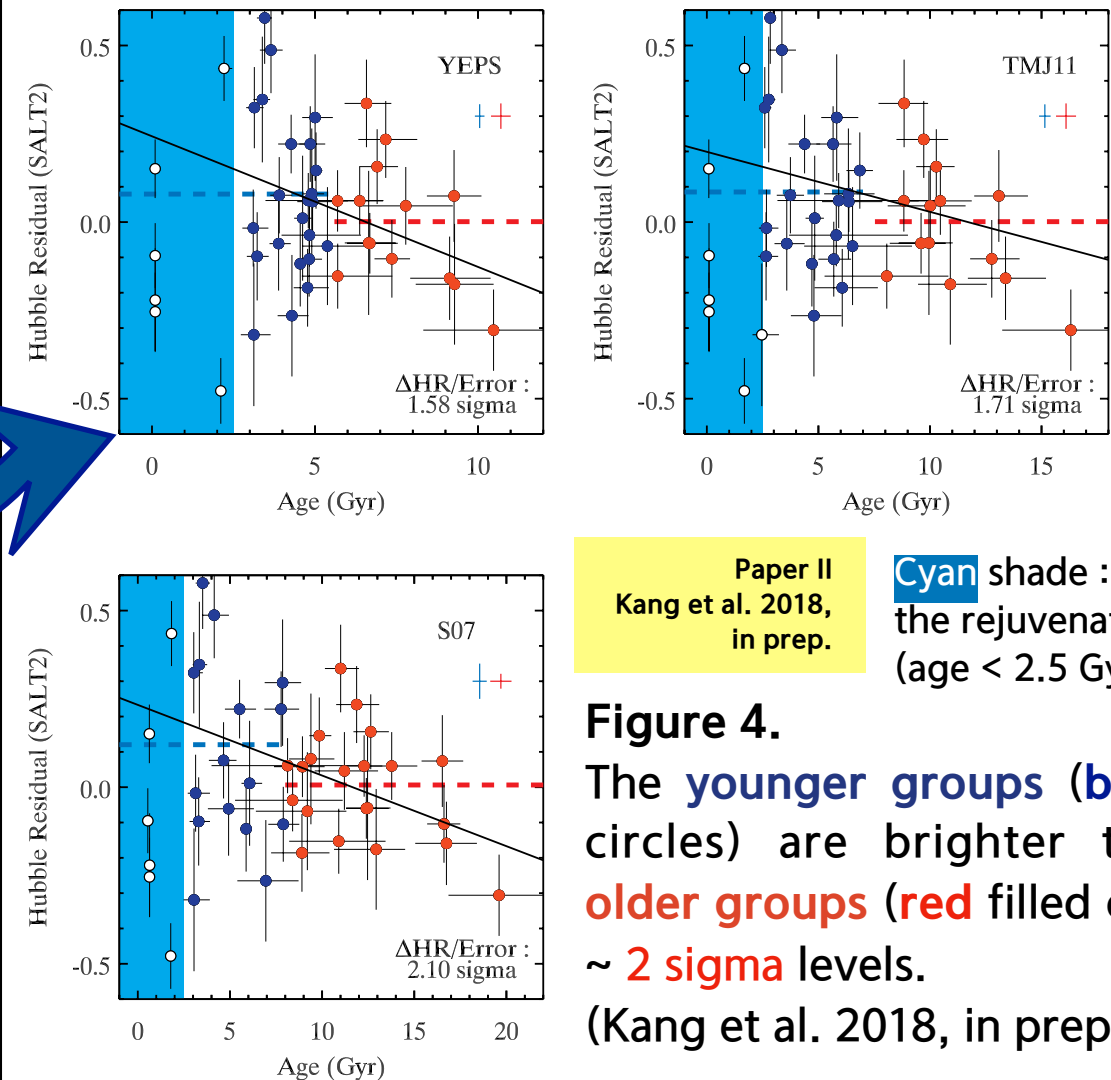


Paper I
Kang et al. (2016)

More Observations
using MMT 6.5m

Figure 3.
For the first time in host galaxy studies, we found a significant ($\sim 3.9\sigma$) correlation between host galaxy mass (velocity dispersion) and population age.

II. Age of Hosts vs. HR of SNe Ia



Paper II
Kang et al. 2018,
in prep.

Cyan shade :
the rejuvenated galaxies
(age < 2.5 Gyr),

Figure 4.
The **younger groups** (blue filled circles) are brighter than the **older groups** (red filled circles) at ~ 2 sigma levels.
(Kang et al. 2018, in prep.)

Future work : The next stages of the project

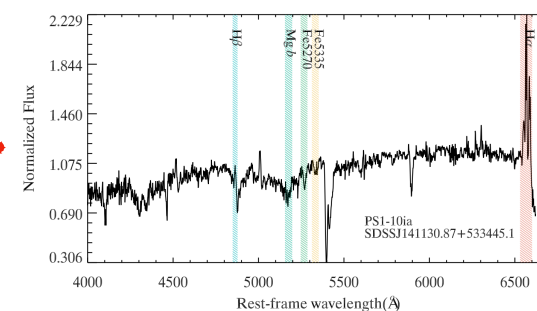
★ Observations for passive host galaxies at higher redshifts ($0.1 < z < 0.4$)

MMT 6.5m (BCS)

Gemini 8.1m (GMOS N & S, longslit) - 2015B, 2016A

★ The effect of local-global difference in stellar population within a nearby early-type host galaxy will also be investigated.

Figure 5.



Younger hosts in local universe
should be compared with
relatively *older hosts* in high- z
(e.g., hosts in yellow band).

"Evolution-free & Dust-free Dark Energy test"

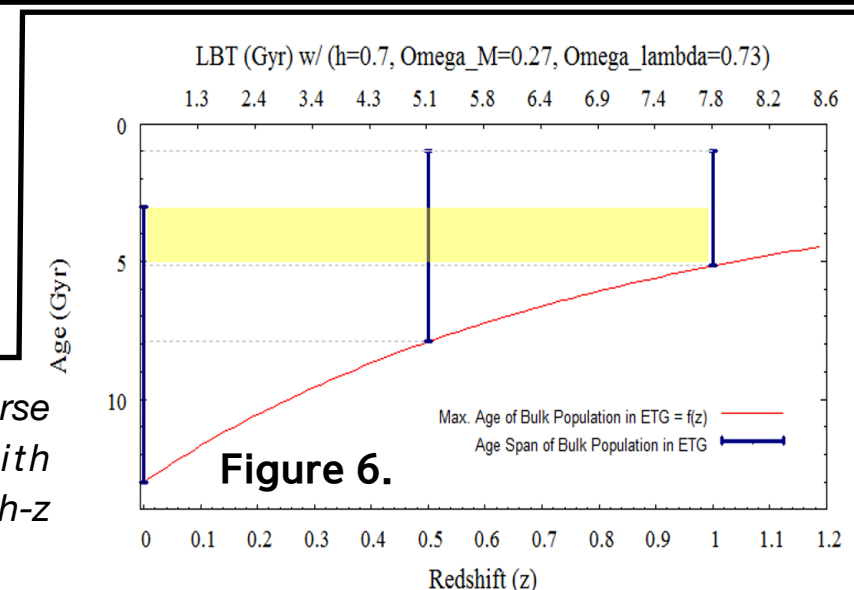


Figure 6.