Properties of Type Ia Supernova Host Galaxies in the Sloan Digital Sky Survey

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Du-Hwan Han, ¹ Changbom Park, ² Yun-Young Choi, ² and Myeong-Gu Park ¹

¹Kyungpook National University
²Korea Institute for Advanced Study
**SDSS-II Supernova Survey**

- Part of the SDSS-II project
- Aim to discover SN Ia in “redshift desert” from $z=0.05$ to $0.4$
- Well-calibrated photometry in multi-band.
- Extensive spectroscopic follow-up
  ARC, HET, MDM, Subaru, WHT, Keck, NMSU, …
SDSS-II Supernova survey

- Larger spatial volume than previous SN survey.
  southern equatorial Stripe 82.
- Repeat imaging during Fall month of 2005-2007
Supernova Sample

- Distribution of SNe: Total ~1600
  - SN Ia – 253 in 2005, 445 till 2006, 612 till 2007
Type Ia Supernova host galaxy

- Host galaxies of Type Ia SN from the photometric & the spectroscopic catalogs (DR7)
  - 90 hosts overlapping with the Main galaxies in the $M_r - z$ space
To investigate the effect of galaxy cluster:

2154 Abell clusters in a region clear enough of the Milky Way.
Properties of SN Ia host galaxy

Color properties

Luminosity function

Distance to nearest neighbor

Local density
Statistical Test

- Kolmogorov-Smirnov test

### Table 1

| Properties & Environments | Morphology | K-S statistics | Probability |
|---------------------------|------------|----------------|-------------|
| u-r color                 | all types  | 0.05685        | 0.92720     |
| u-r color                 | early type | 0.17814        | 0.17315     |
| u-r color                 | late type  | 0.69446        | 0.71319     |
| g-r color                 | all types  | 0.07799        | 0.62971     |
| g-r color                 | early type | 0.11629        | 0.67451     |
| g-r color                 | late type  | 0.13579        | 0.26507     |
| Luminosity                | all types  | 0.18528        | 0.00359     |
| Luminosity                | early type | 0.21491        | 0.05688     |
| Luminosity                | late type  | 0.23991        | 0.00367     |
| nearest neighbor          | all types  | 0.10182        | 0.35532     |
| nearest neighbor          | early type | 0.12788        | 0.60712     |
| nearest neighbor          | late type  | 0.18350        | 0.07543     |
| local density             | all types  | 0.07019        | 0.88634     |
| local density             | early type | 0.13246        | 0.68691     |
| local density             | late type  | 0.18596        | 0.12085     |
| nearest Abell cluster     | all types  | 0.26416        | 0.06724     |