Classification of Transients with SPRAT on the LT

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OPTICON supports SPRAT
Early Phase SNe

- Less than 5 days before maximum brightness
- “Interesting” types Ib/c, II or SLSNe
- Provides information on progenitor/CSM
SPRAT Spectrograph

Low Resolution, R=350. High Sensitivity

Optical, $\lambda = 4000-8000 \ \text{Å}$

Selectable Peak Sensitivity
Red 6500 Å or Blue 5500 Å

Automatic Target Acquisition in Imaging Mode

Single Object Spectra
Acquisition – BD+28 4211

Exposure = 10s
Initial frame.
7.5 x 1.9 arcmin
Object off magic pixel.

Acquisition by WCS or brightest object.
Object on magic pixel.

Slit deployed.
Object centred on slit.
Autoguider tracking.
Raster image of L1_IMAGE and SPEC_* extensions for file v_e_20151028_5_1_0_2.fits

Astrophysics Research Institute
Sources of Transient Alerts

- Pan-STARRS
- ASAS-SN
- The Astronomer’s Telegram
- SPRAT
- MASTER Robotic Network
- Other: CBAT, KISS, Črni Vrh, iPTF, Etc.
Throughput

As measured 2015-04-01
Re-coating of LT primary and secondary completed 2015-06-31
**Throughput**

As measured 2015-04-01

Re-coating of LT primary and secondary completed 2015-06-31

Predicted increase based on throughput in 2006
Throughput

Throughput as measured 2015-04-01

Re-coating of LT primary and secondary completed 2015-06-31

Predicted increase based on throughput in 2006

Throughput as measured in 2015-07-03
Classification using SNID

Gaia15ace
Obs. Lag = 14 days
Classification done with SNID (Blondin & Tonry)

Type SN Ia +19 days
(98% Probability)

Exposure = 500s
Mag = ~16.0
Overall SNR = ~5
Classification using SNID

ASASSN-15ho
Obs. Lag = 3.8 days
Classification done with SNID (Blondin & Tonry)

Type SN Ia +3 days
(100% Probability)

Exposure = 600s
Mag = 17.0
Overall SNR = ~20
Classification Lag

Median Delay Between First Detection and Obs.

- Gaia: 12.5 days
- Pan-STARRS: 4.5 days
- ASAS-SN: 3.6 days
SNR & Object Classification

Variation in Object Type Classification with SNR (400-800nm)

Number of Classifications

SNR [bin width=5]

Full Wavelength Range
400-800 nm
SNR & Object Classification

Variation in Object Type Classification with SNR (450-750nm)

Reduced Wavelength Range
450-750 nm
SNR and Flux

Wavelength Ranges
Full 400-800 nm
Mid 450-750 nm
Blue 700-800 nm
Red 400-500 nm
Type Ia Age Estimation

ARI SNID and External ATel Estimations of Type Ia SN Age (mean)

![Graph showing the relationship between ARI SNID adjusted mean age and external ATel age. The x-axis represents external ATel age in days, ranging from -10 to 15, and the y-axis represents ARI SNID adjusted mean age in days, ranging from -10 to 20. The graph includes error bars indicating variability. A linear trend line is also shown.]
Type II Age Estimation

ARI SNID and External Atel Estimation of Type II SN Age

ARI SNID Adjusted Age [days]

External ATel Age [days]
Type II Age Estimation

ARI SNID and External Atel Estimation of Type II SN Age

ARI SNID Adjusted Age [days]

External ATel Age [days]

"+20 days"

SNR=3
Si Velocity Comparison

Comparison of Si Velocity Estimation in Type Ia SN

Type Ia SN Si Velocities
Follow Up - SN2015G

Disc. 2015-03-26
Host NGC 6951
[ K. Shima ]

Red mode

Exposure 1200 s
(3 x 400 s)

04-27 Exposure
Clouded ~400s

HST Exposure
Unknown

SN2015G - Type Ibn

De-reddened Flux + offset assuming E(B-V)=0.33

Rest Wavelength [Angstrom] assuming z=0.00475
## Observation Summary

### Classification

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<thead>
<tr>
<th>Classification</th>
<th>Count</th>
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<tbody>
<tr>
<td>SN Ia</td>
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<tr>
<td>SN Ia-91T</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>68</strong></td>
</tr>
</tbody>
</table>

14 SN classified at pre-max

Earliest Phase PS15ahs Ia -15 days

Fastest ASASSN-15ni CV ~12 hours