The Zwicky Transient Facility
Bright Transient Survey

C. Fremling, Y. Sharma, A. Dugas, S. Kulkarni + students (Caltech)
N. Blagorodnova, R. Walters, J. D. Neill (Caltech P60 SEDM team)
and collaborators at OKC, LJMU, UW, Northwestern, WIS

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Bright Transient Survey

P48

SEDM

P200

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The ZTF Bright Transient Survey (BTS)

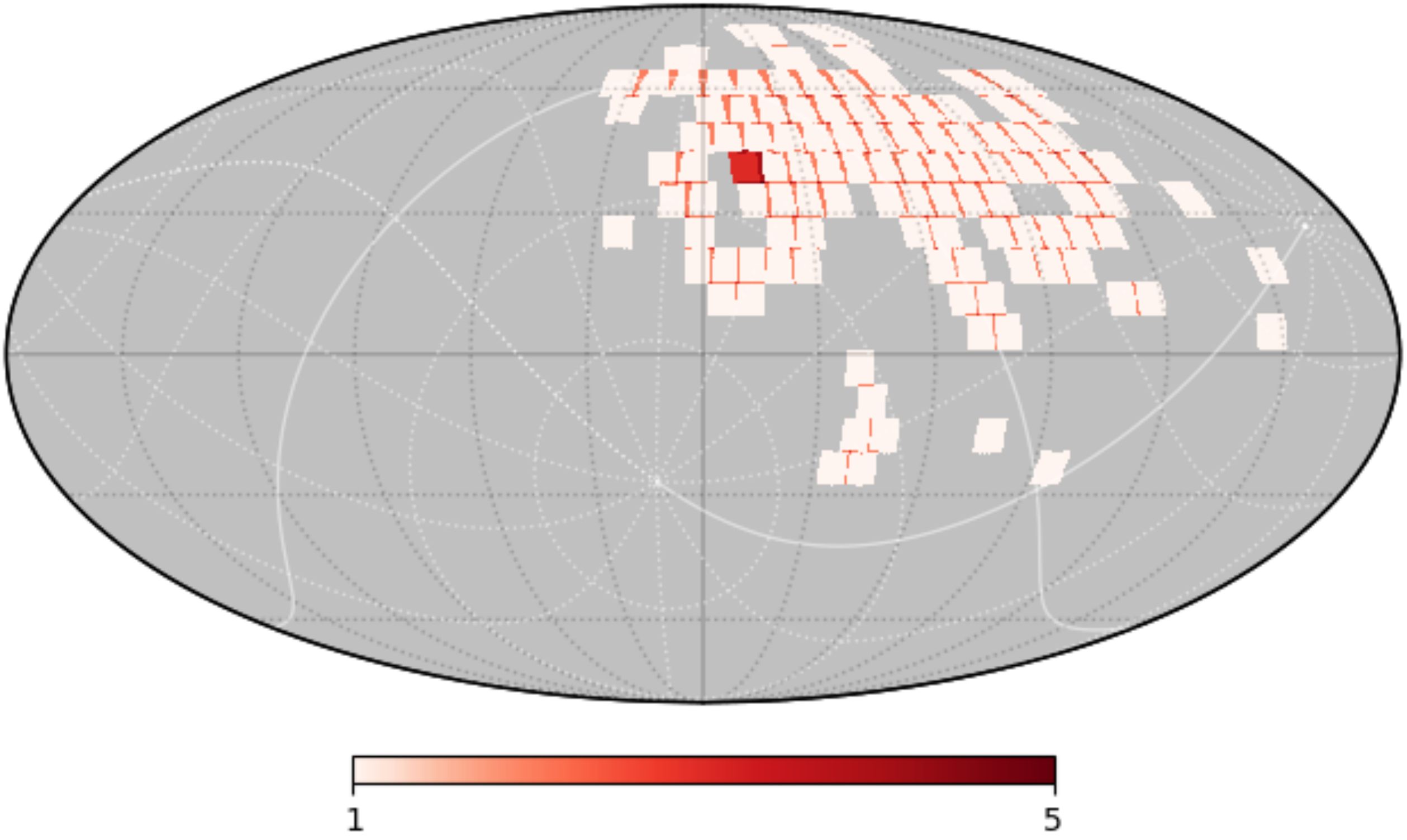
Magnitude limited survey, complete to 18.5 mag.

Data from the public ZTF Northern Sky Survey

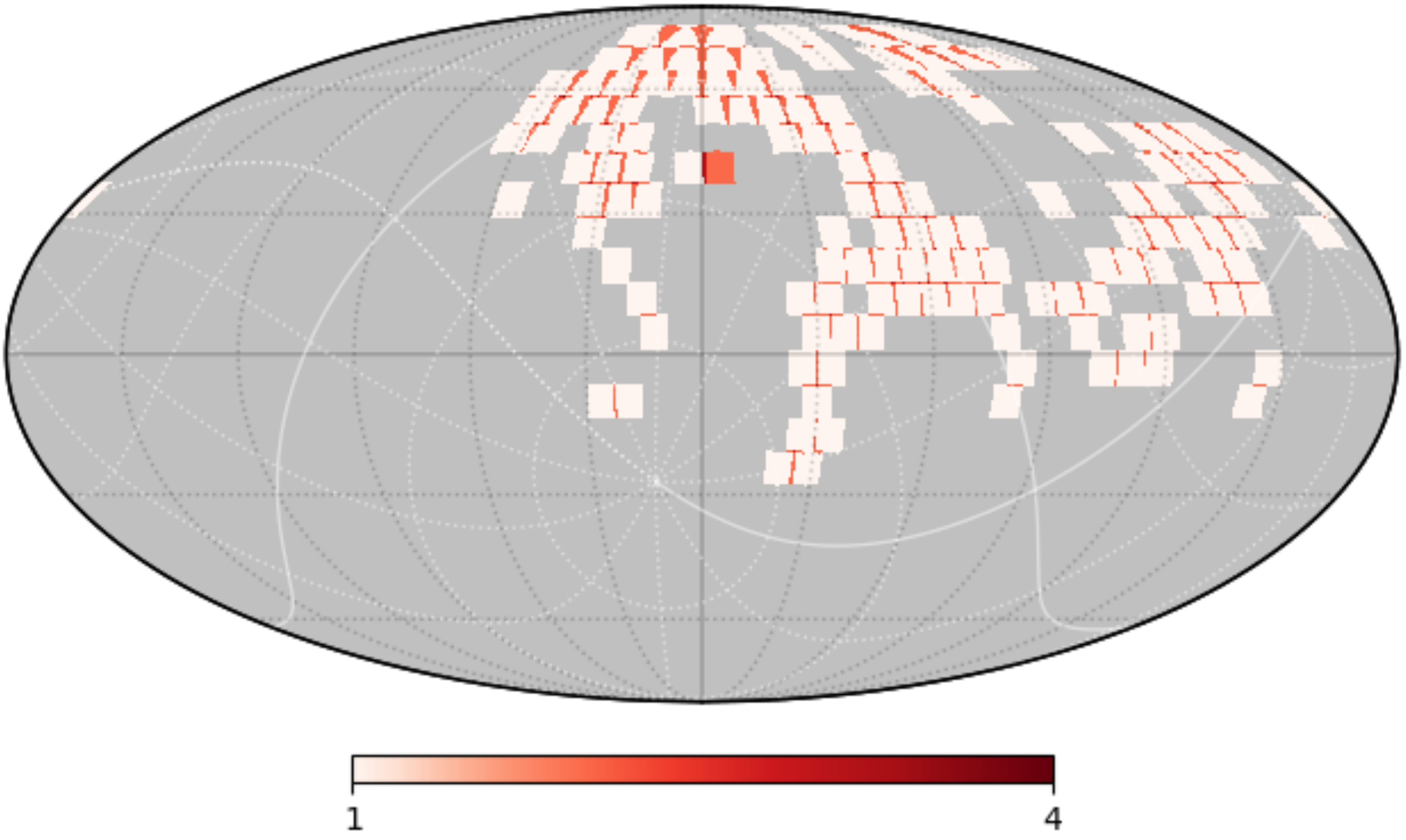
("Celestial Cinematography"; Bellm & Kulkarni, 2017, Nature Astronomy 1, 71)

3 day cadence, Northern Sky in g & r filters

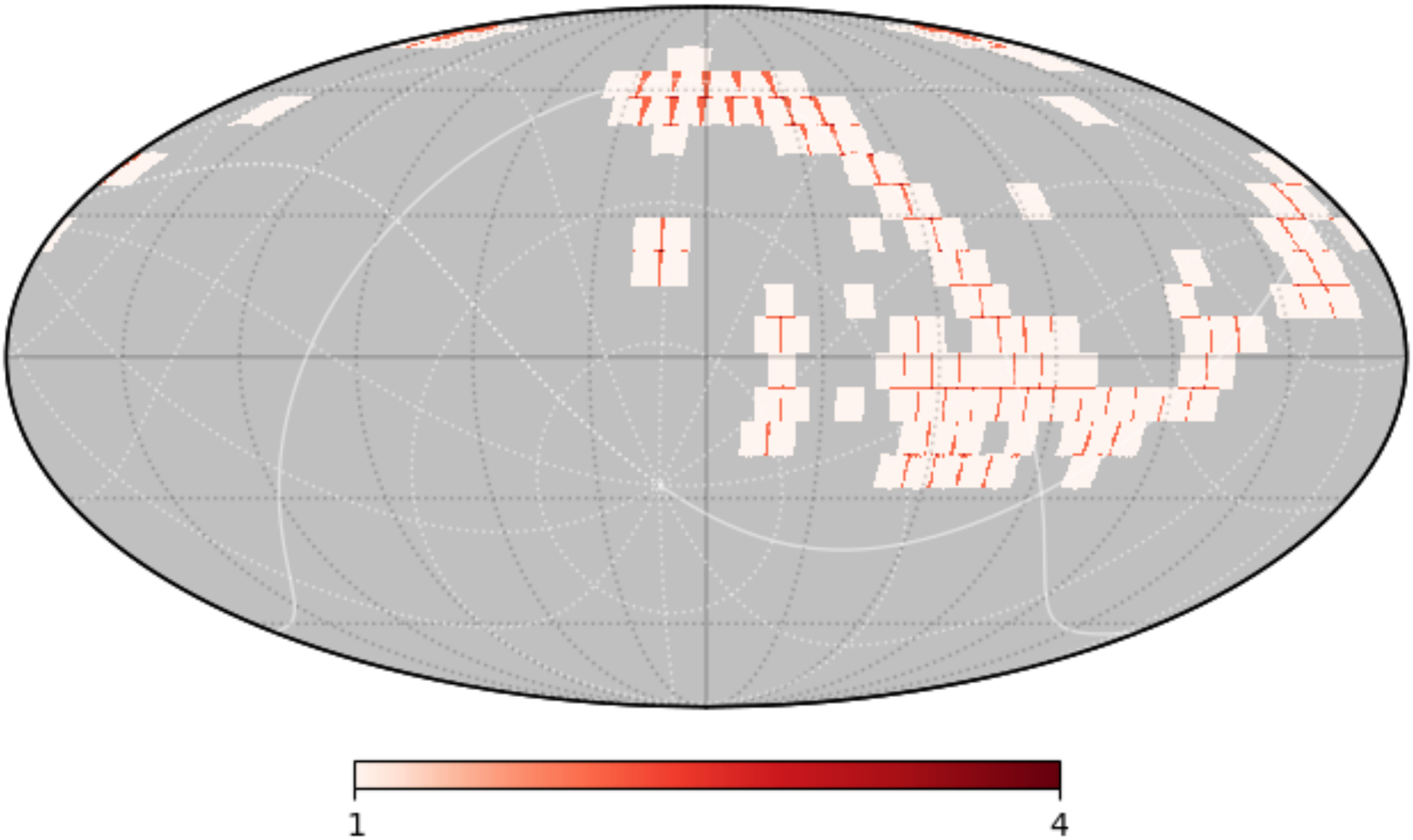
ZTF : R : Equatorial : Public Survey : 2018-07-03



ZTF : R : Equatorial : Public Survey : 2018-07-04



ZTF : R : Equatorial : Public Survey : 2018-07-05



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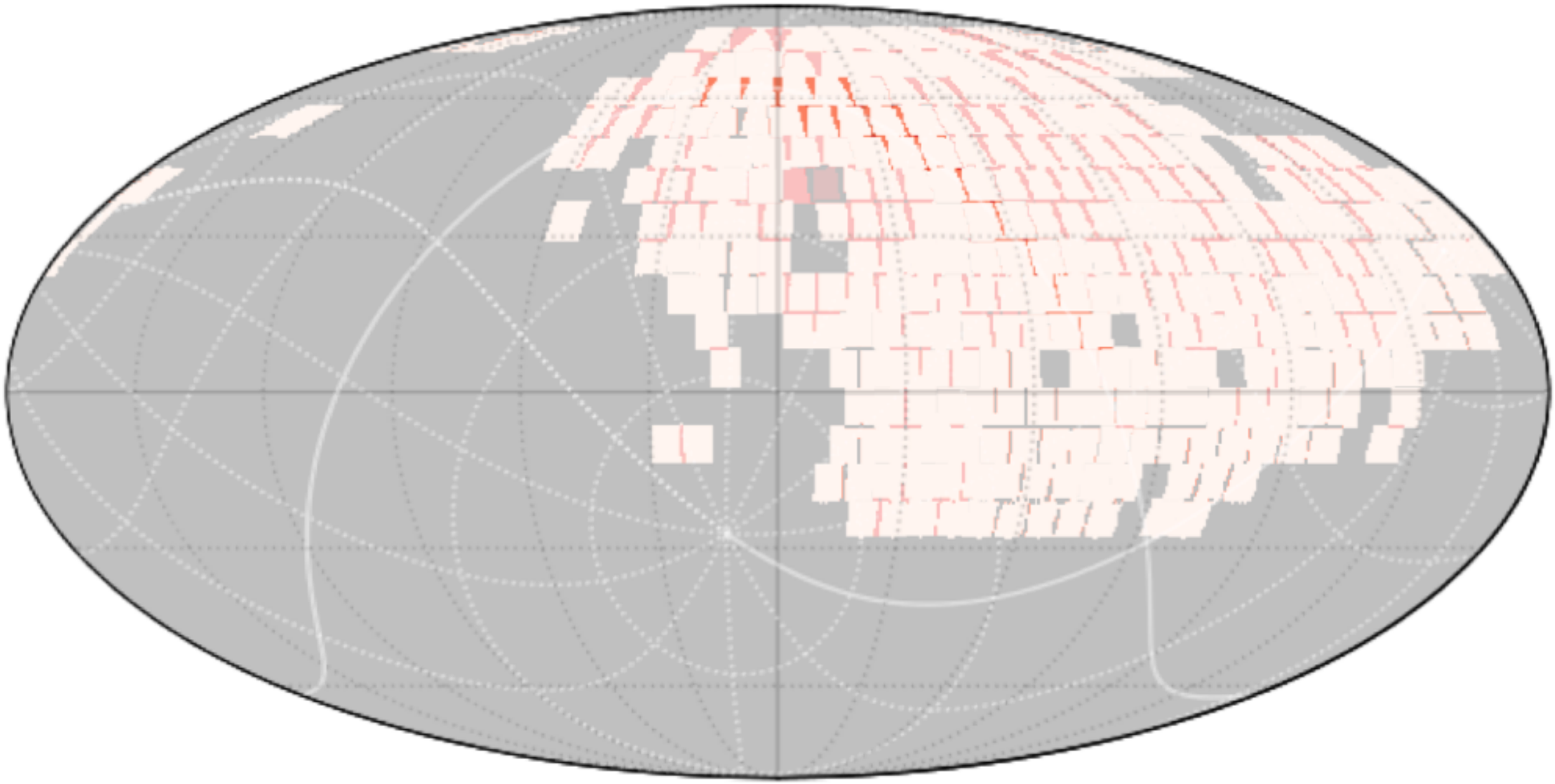
ZTF : R : Equatorial : Public Survey : 2018-07- **3-5**



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The ZTF Bright Transient Survey (BTS)

The public ZTF Northern Sky Survey
~200 000 alerts per night

https://ztf.uw.edu/alerts/public/

MARS
Make Alerts Really Simple

The ZTF Bright Transient Survey (BTS)

BTS

Magnitude limited survey, complete to 18.5 mag.

1. Send all SN candidates < 19 mag to the Transient Name Server

2. Classify subset (<18.5 mag) using Palomar 60 inch with SEDM

The ZTF Bright Transient Survey (BTS)

BTS candidate filter

(1) Transient candidate brightness < 19 mag.

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(3) Minimum of two detections separated by > 30 minutes.

The ZTF Bright Transient Survey (BTS)

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(1) Transient candidate brightness < 19 mag.
(2) Transient candidate > 20 arcsec from bright stars (r < 15 mag).
(3) Minimum of two detections separated by > 30 minutes.
(4) No star-like source spatially coincident with the transient
(we employ a machine-learning star-galaxy separator, based on PS1 data; cf. Miller et al. 2017, AJ, 73).

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(5) Galactic latitude cut of 7 degrees.
(6) Final human vetting to filter out clearly bogus alerts and stel alerts
(might not be needed as real-bogus system of ZTF improves)

The ZTF Bright Transient Survey (BTS)

BTS candidate filter

Candidates that pass our filter, and human vetting, are automatically sent to the Transient Name Server (TNS) once daily.

Official start, 2018 June 2

ATel #11688

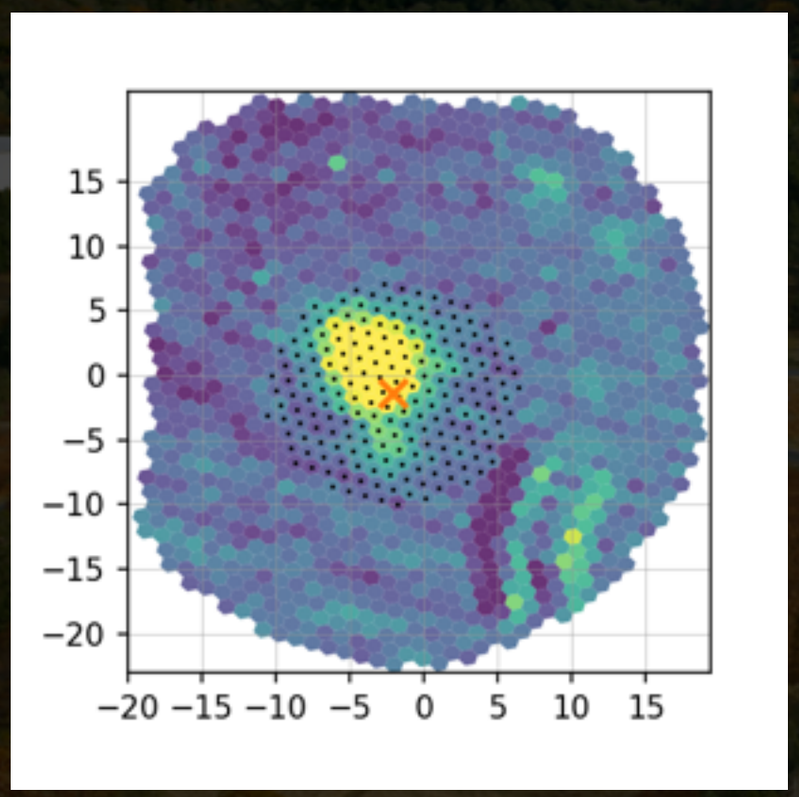
The ZTF Bright Transient Survey (BTS)

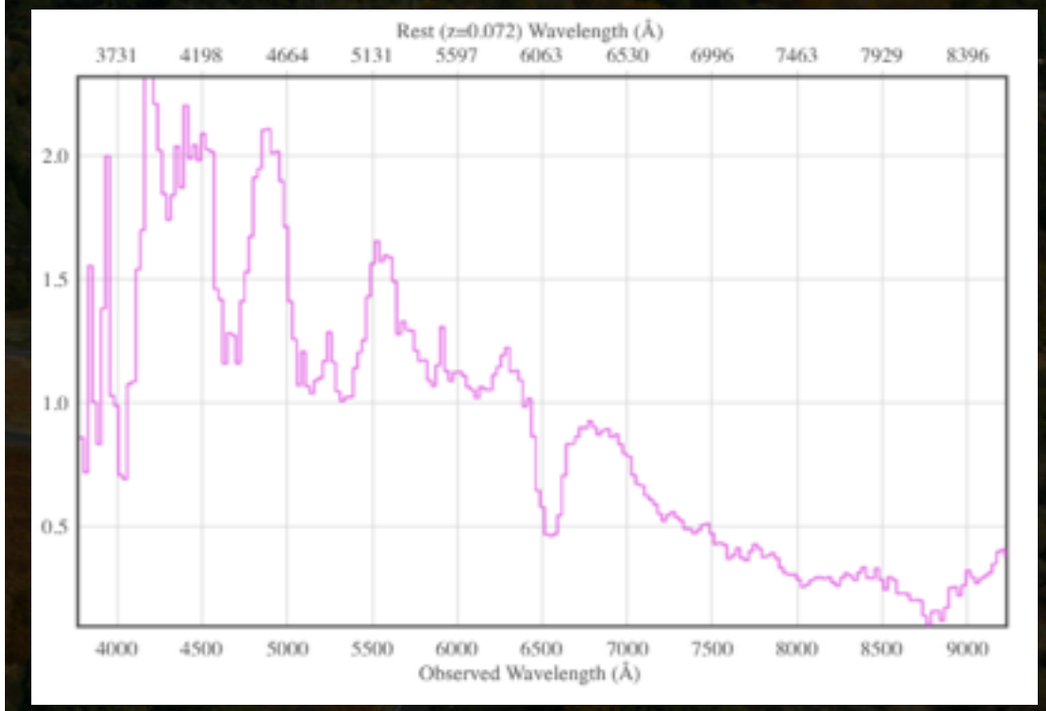
SEDM classifications

Goal is spectroscopically classify all transients brighter than 18.5 mag, using SEDM. Currently we trigger at ~19 mag.

The ZTF Bright Transient Survey (BTS)

SEDM classifications



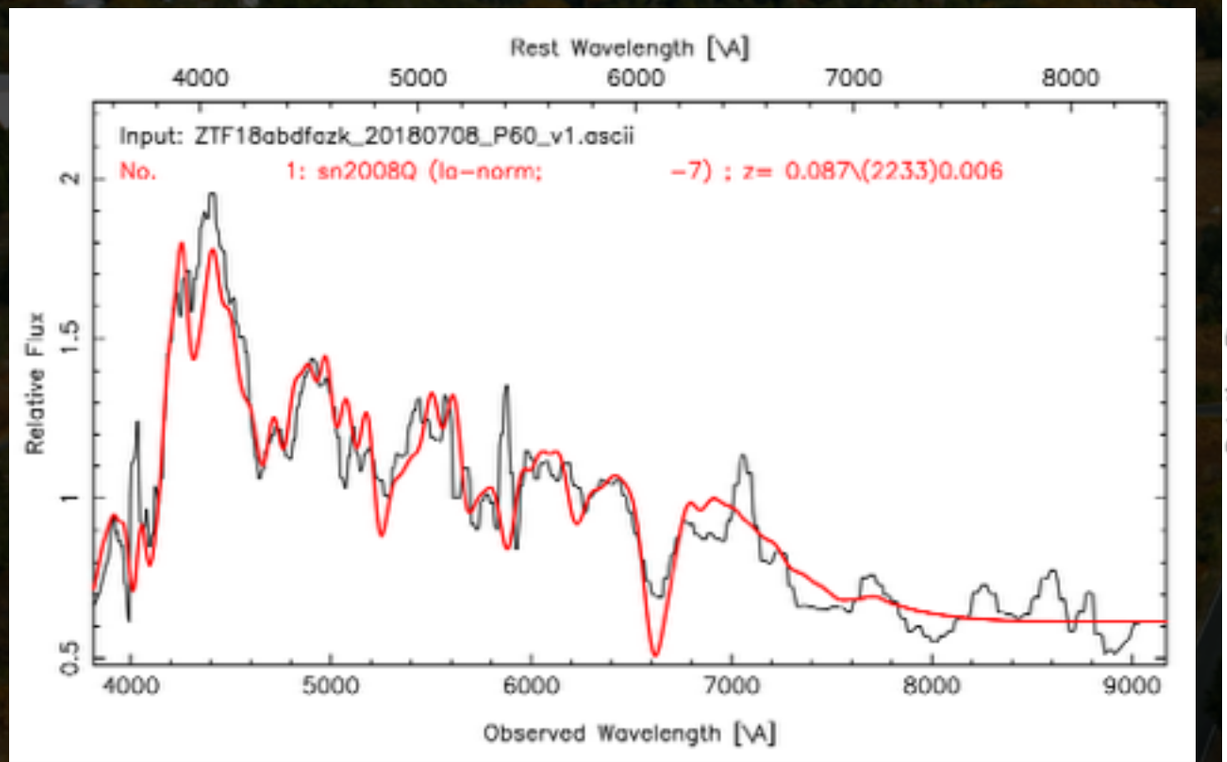


SEDM, 18.5 mag
25 min exp

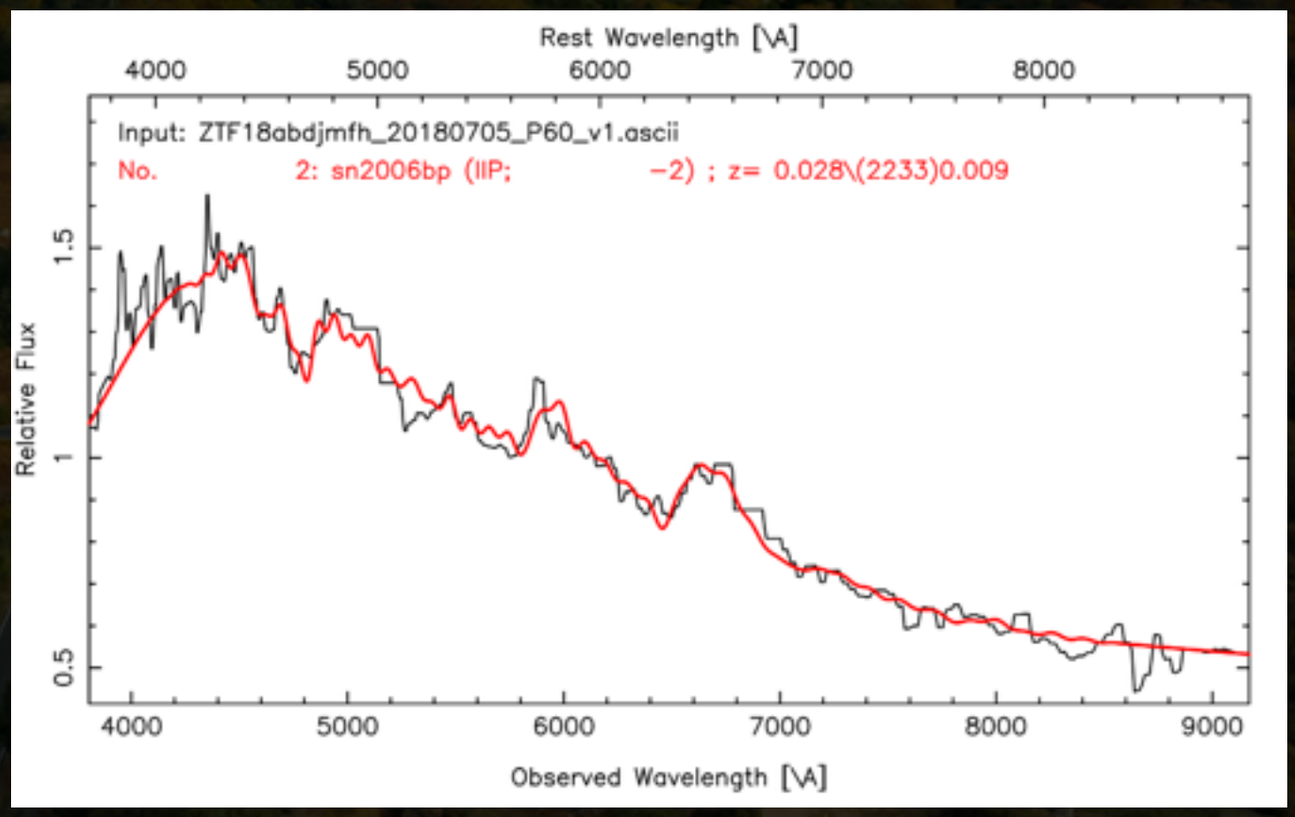
The ZTF Bright Transient Survey (BTS)

SEDM classifications

Based on SNID



SN Ia



SN II

The ZTF Bright Transient Survey (BTS)

BTS classifications

Daily, publish successful classifications to TNS

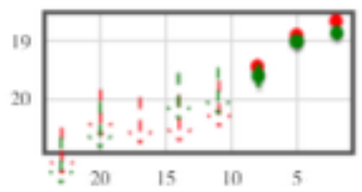
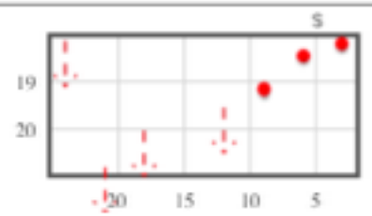
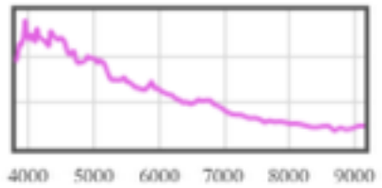
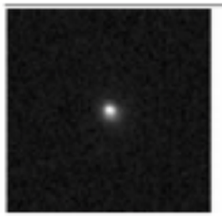
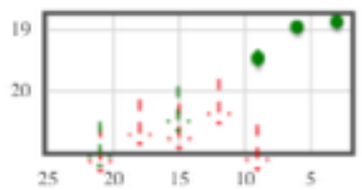
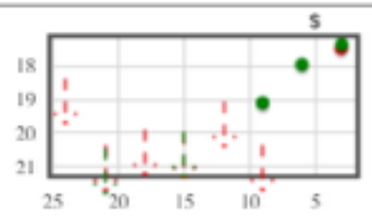
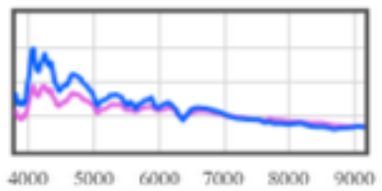
Weekly, publish successful classifications as ATels
(see e.g. ATels 11829, 11830)

The ZTF Bright Transient Survey (BTS)

BTS classifications

When SEDM fails, we use other facilities — Mainly Palomar 200 inch.

NOT, LT, APO + community, via TNS. GROWTH?

	ZTF18abdkiaq (8.1 d)	None	0.06433	13:07:26.98 +18:46:43.1	r = 18.6 (2.1 d)		no spectra found
	ZTF18abdjmfh (8.9 d)	SN IIP	0.03	16:15:08.81 +26:33:36.1	r = 18.2 (3.1 d)		 2018-07-05 SEDM
	ZTF18aamgcbt (9.0 d)	None		14:11:05.92 +41:09:20.8	r > 20.5 (9.1 d)		no spectra found
	ZTF18abdiqdh (9.0 d)	SN Ia	0.03834	12:18:44.04 +44:46:55.1	r = 17.5 (3.1 d)		 2018-07-05 SEDM

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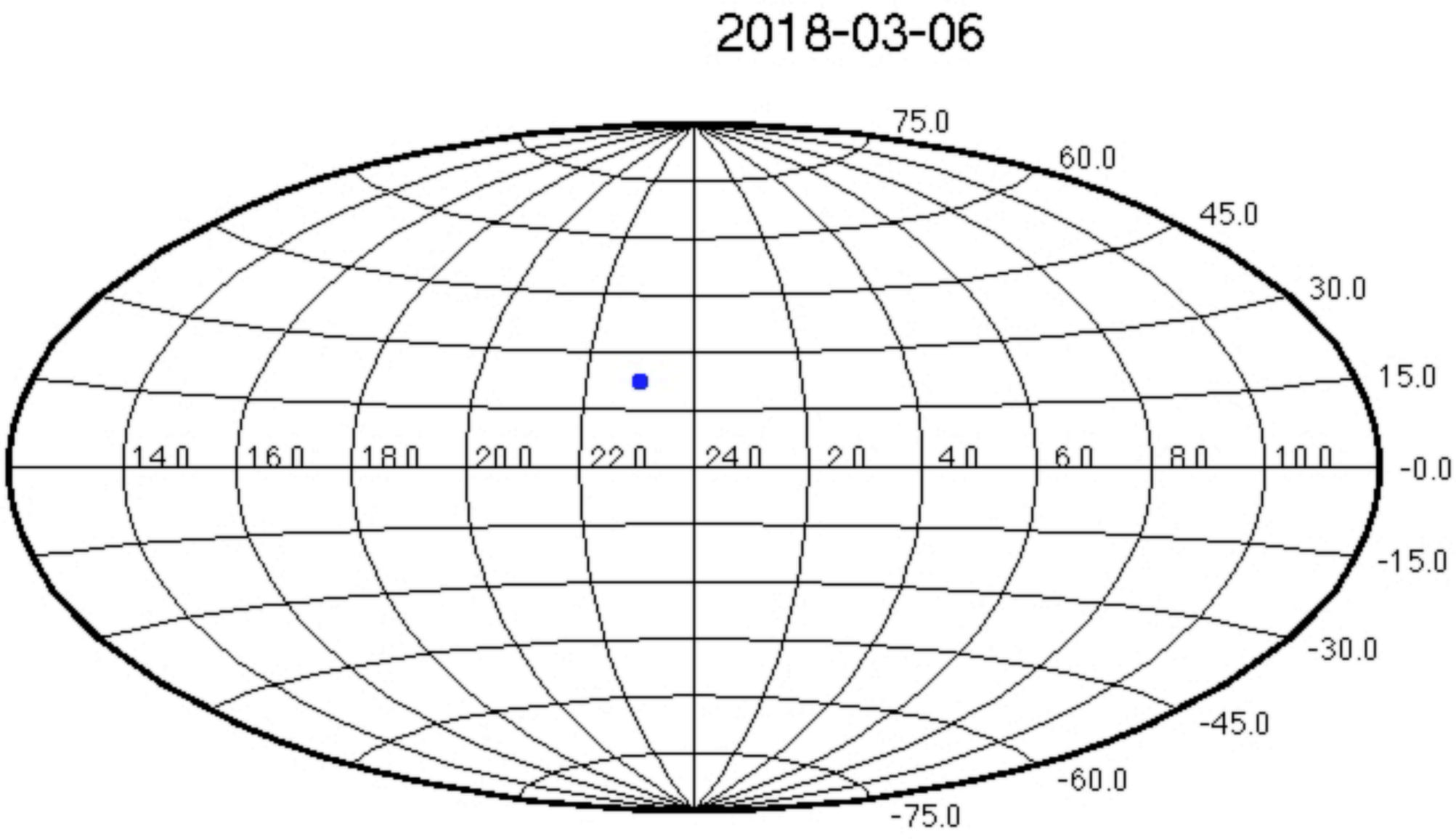

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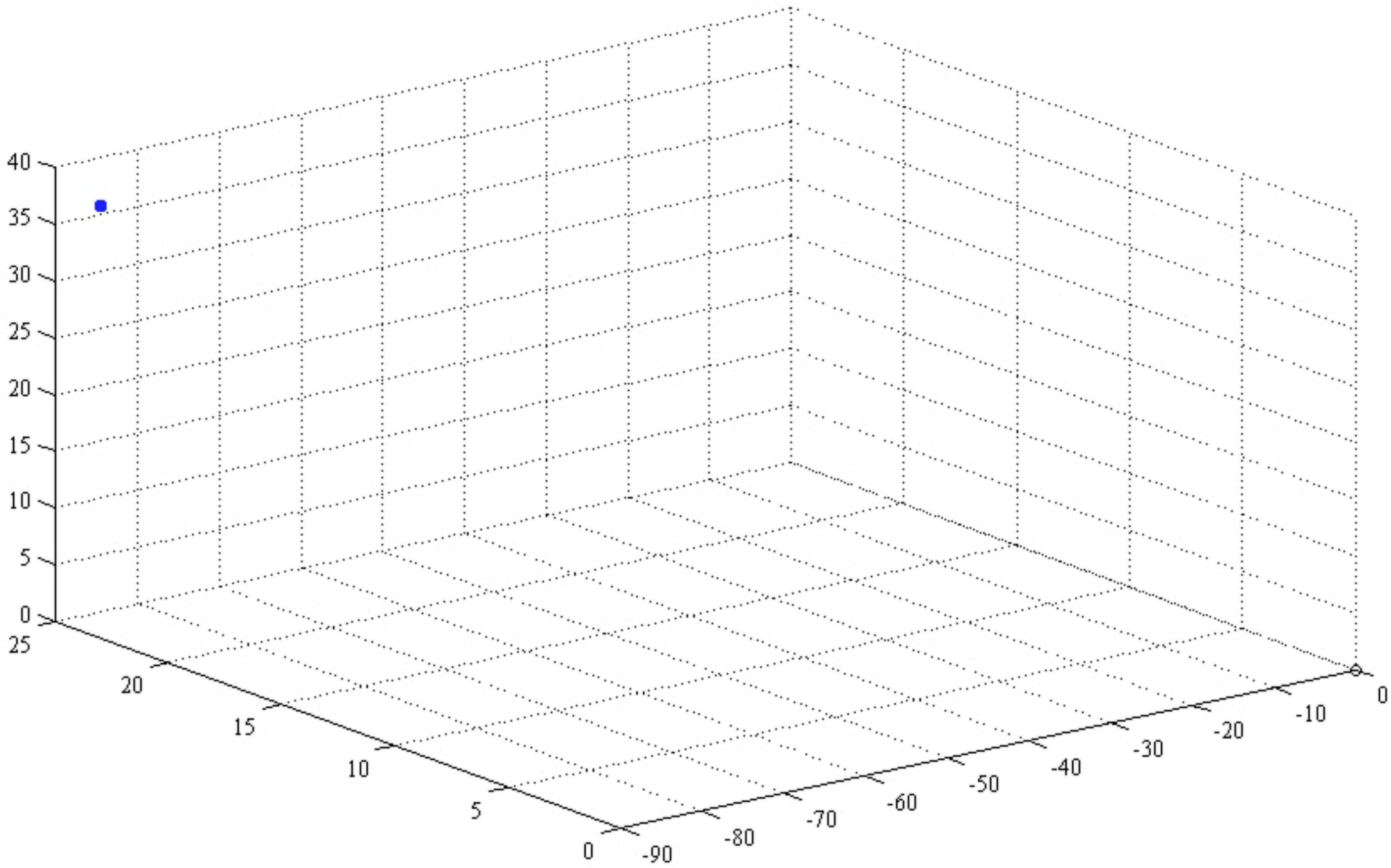


The ZTF Bright Transient Survey (BTS)

BTS preliminary results

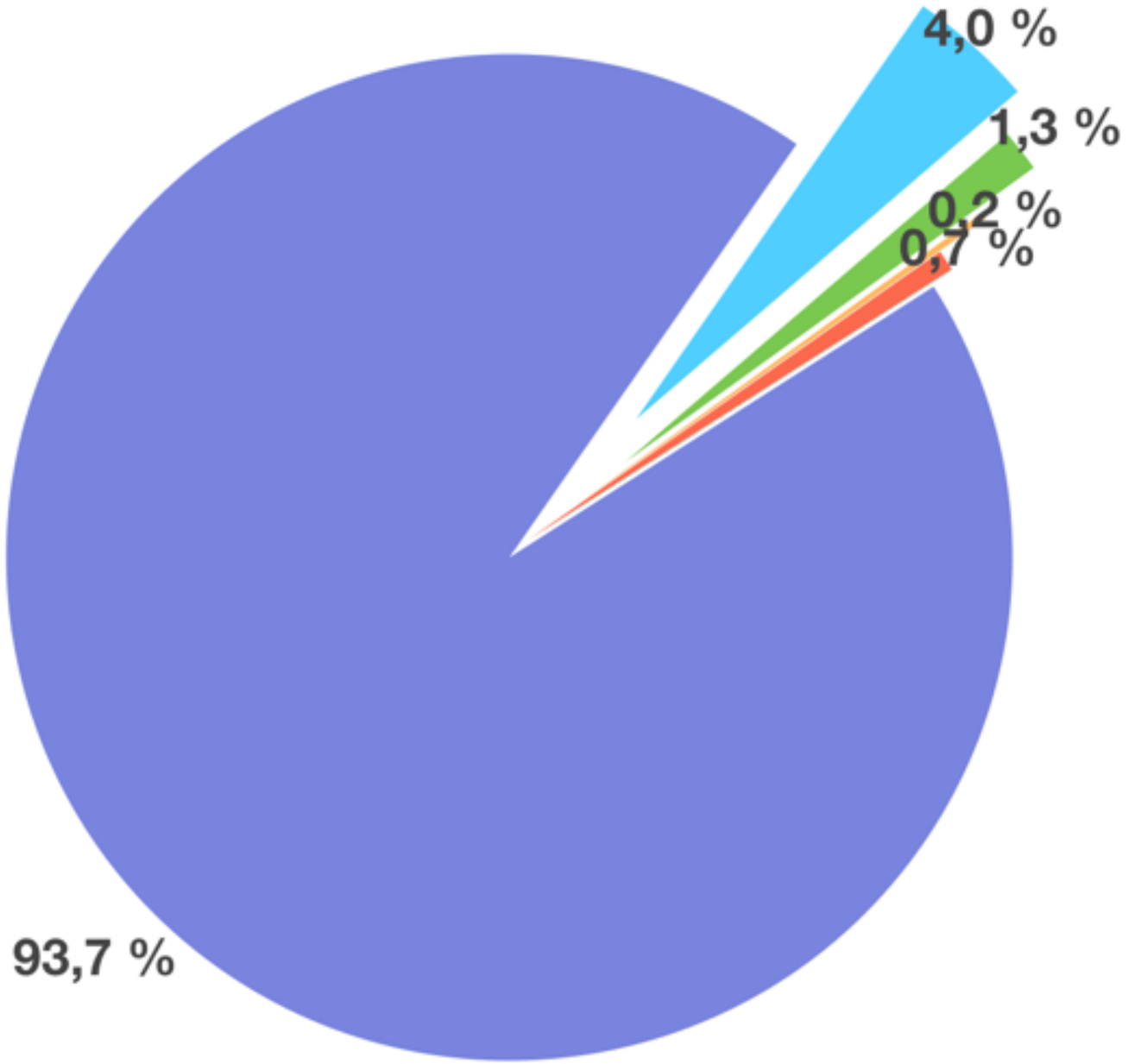
In total, thus far we have classified:

445 SNe Ia

177 CC SNe

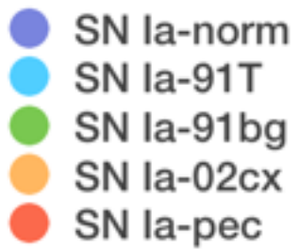
Total: 622 SNe

The ZTF Bright Transient Survey (BTS)



BTS Type Ia SNe (total: 445)

SUBTYPE	NUMBER
SN Ia-norm	417
SN Ia-91T	18
SN Ia-91bg	6
SN Ia-02cx	1
SN Ia-pec	3



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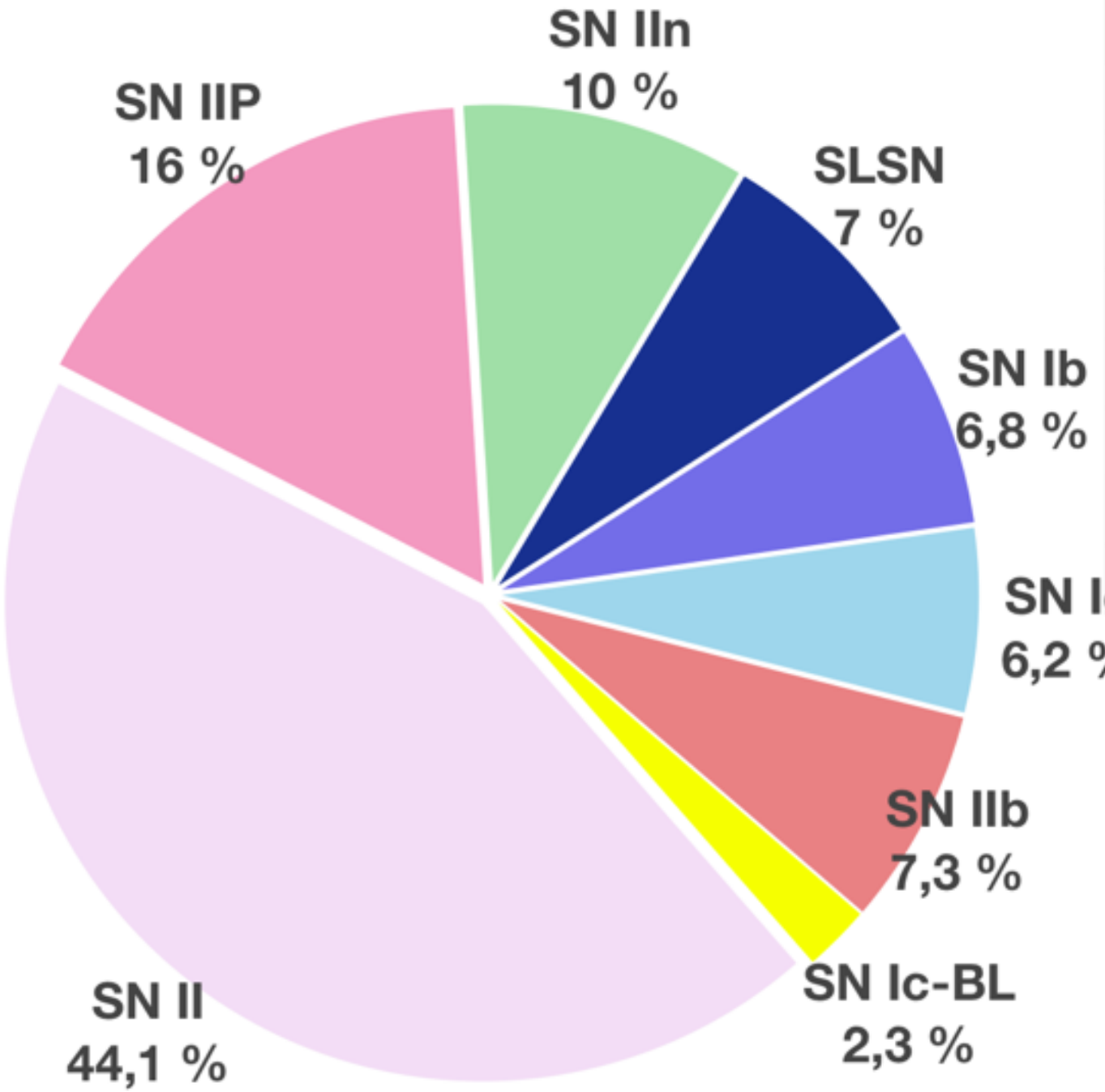
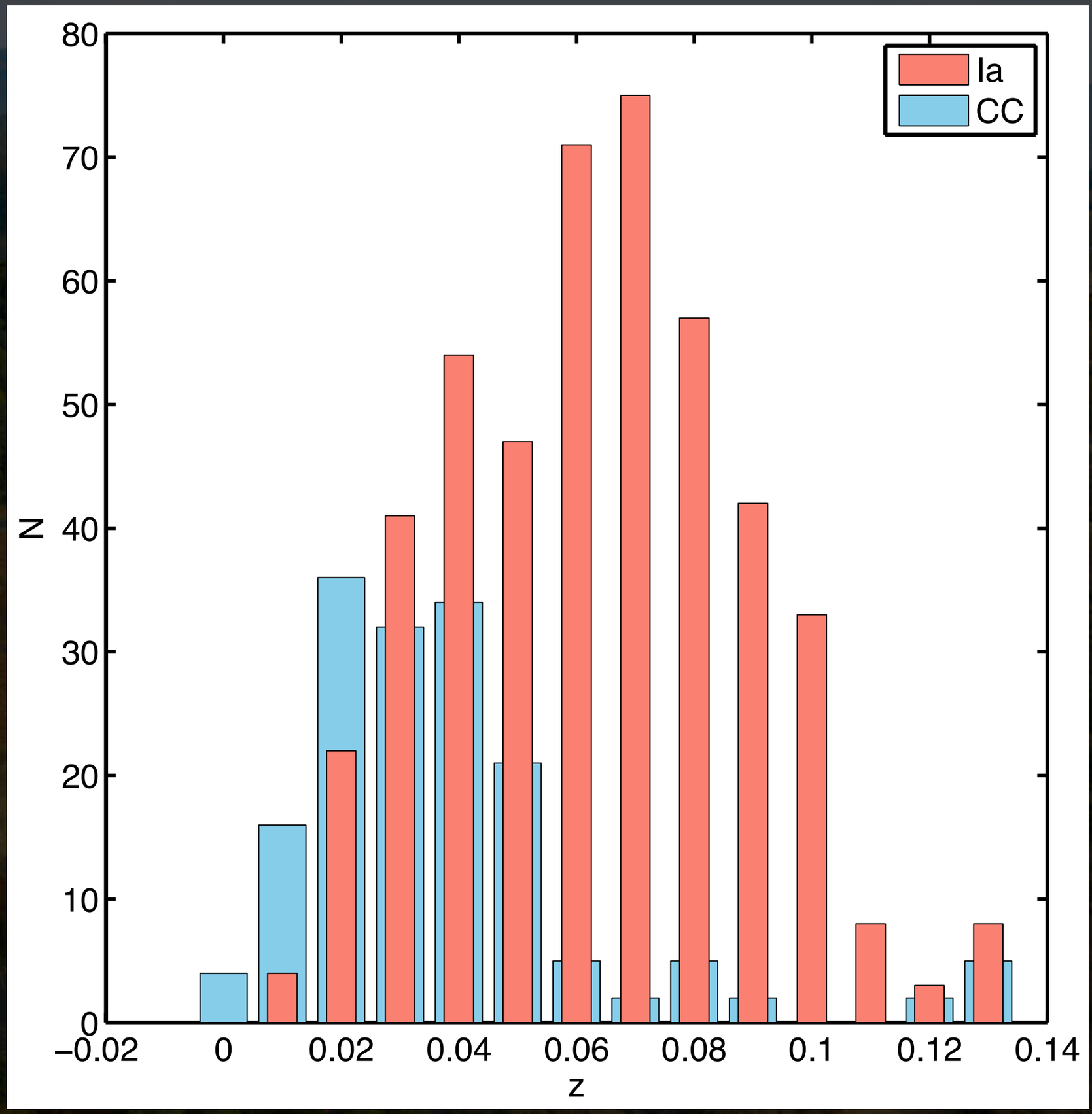


BTS CC SNe (total: 177)

SUBTYPE	NUMBER
SN Ib	12
SN Ic	11
SN IIb	13
SN Ic-BL	4
SN II	78
SN IIP	29
SN IIn	17
SLSN	**13**

The ZTF Bright Transient Survey (BTS)



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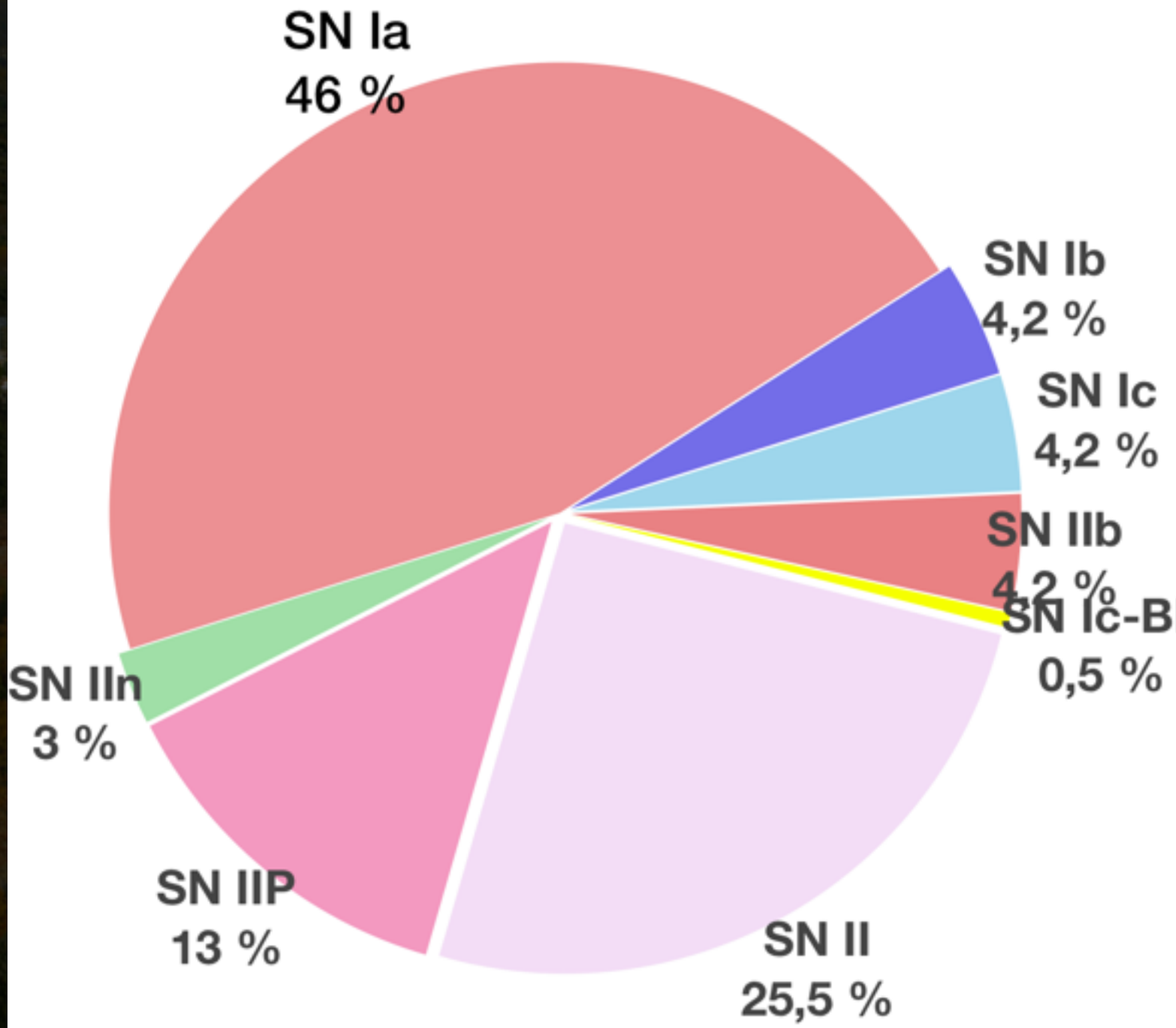
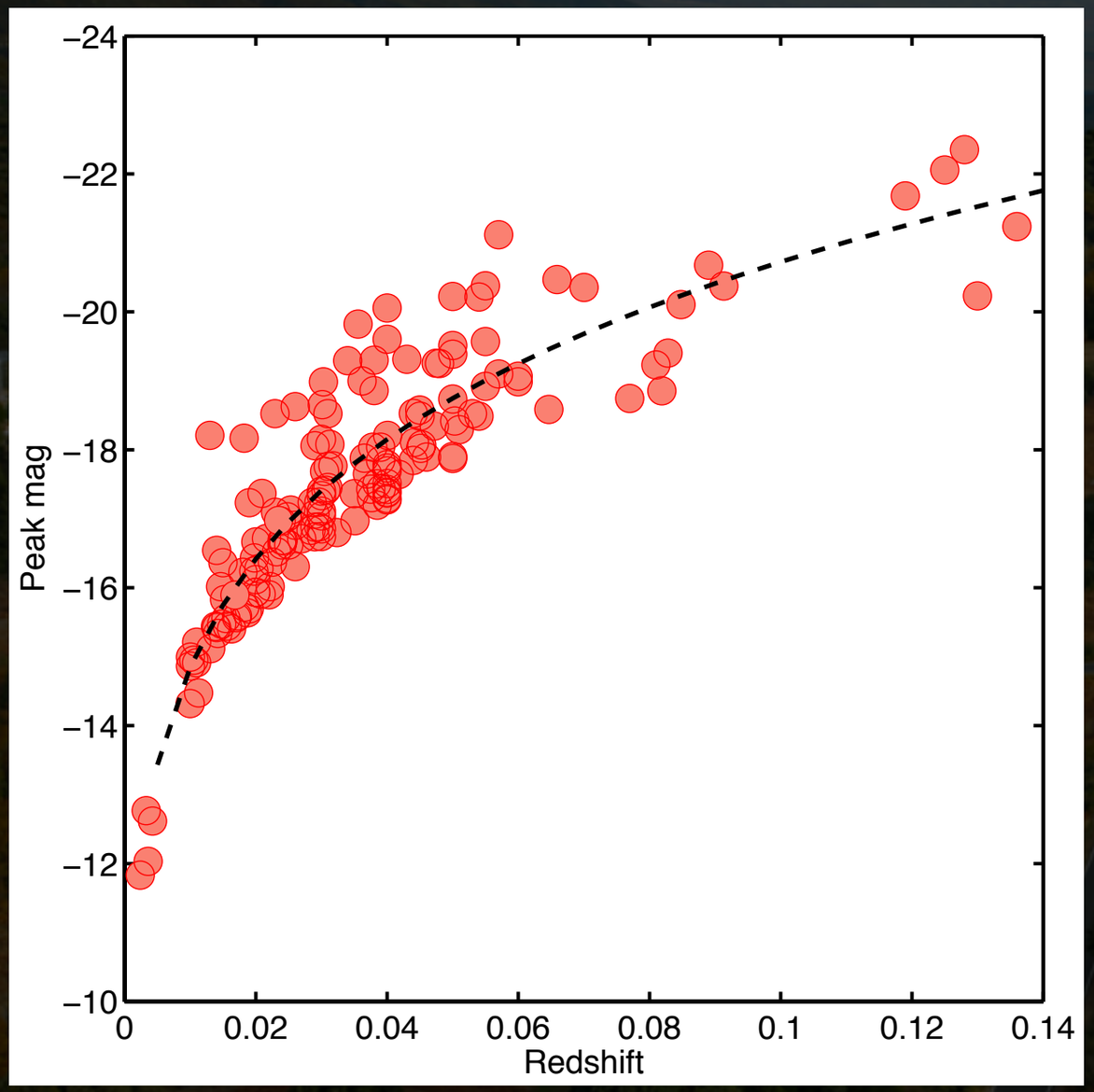
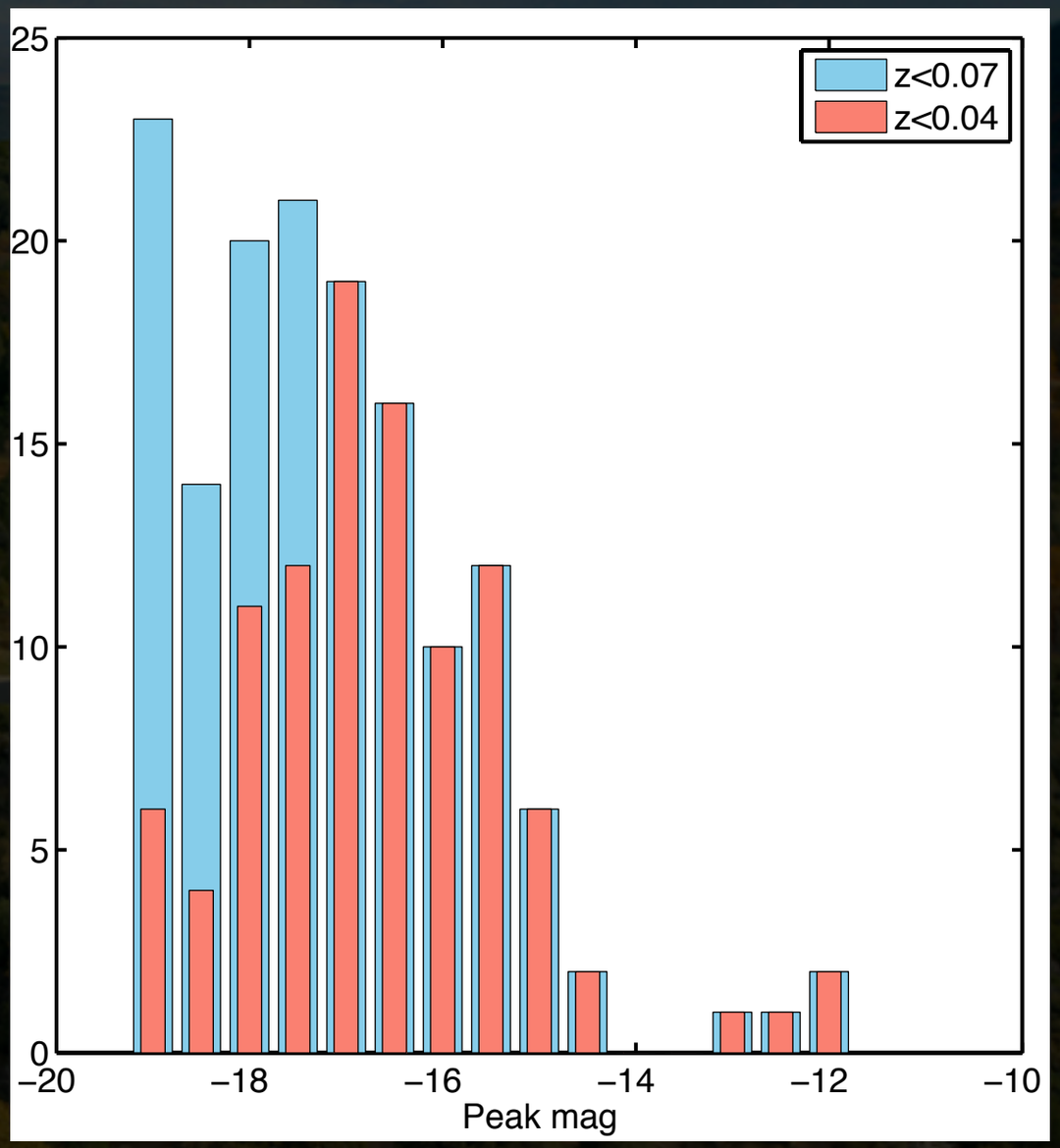


BTS SNe at z<0.04 (total: 192)

SUBTYPE	NUMBER
SN Ib	8
SN Ic	8
SN IIb	8
SN Ic-BL	1
SN II	49
SN IIP	25
SN IIn	5
SLSN	0
SN Ia	88

The ZTF Bright Transient Survey (BTS)





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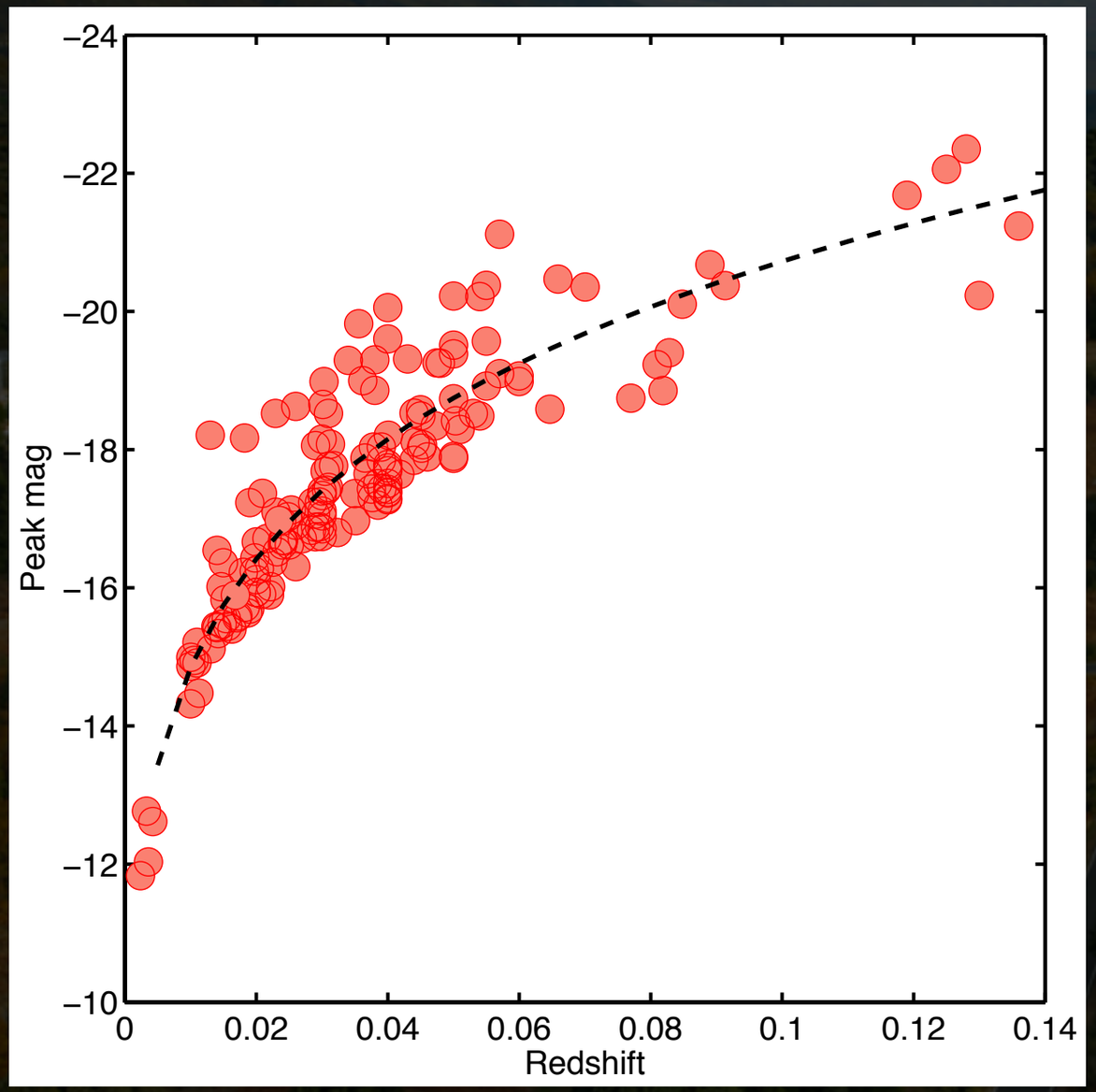

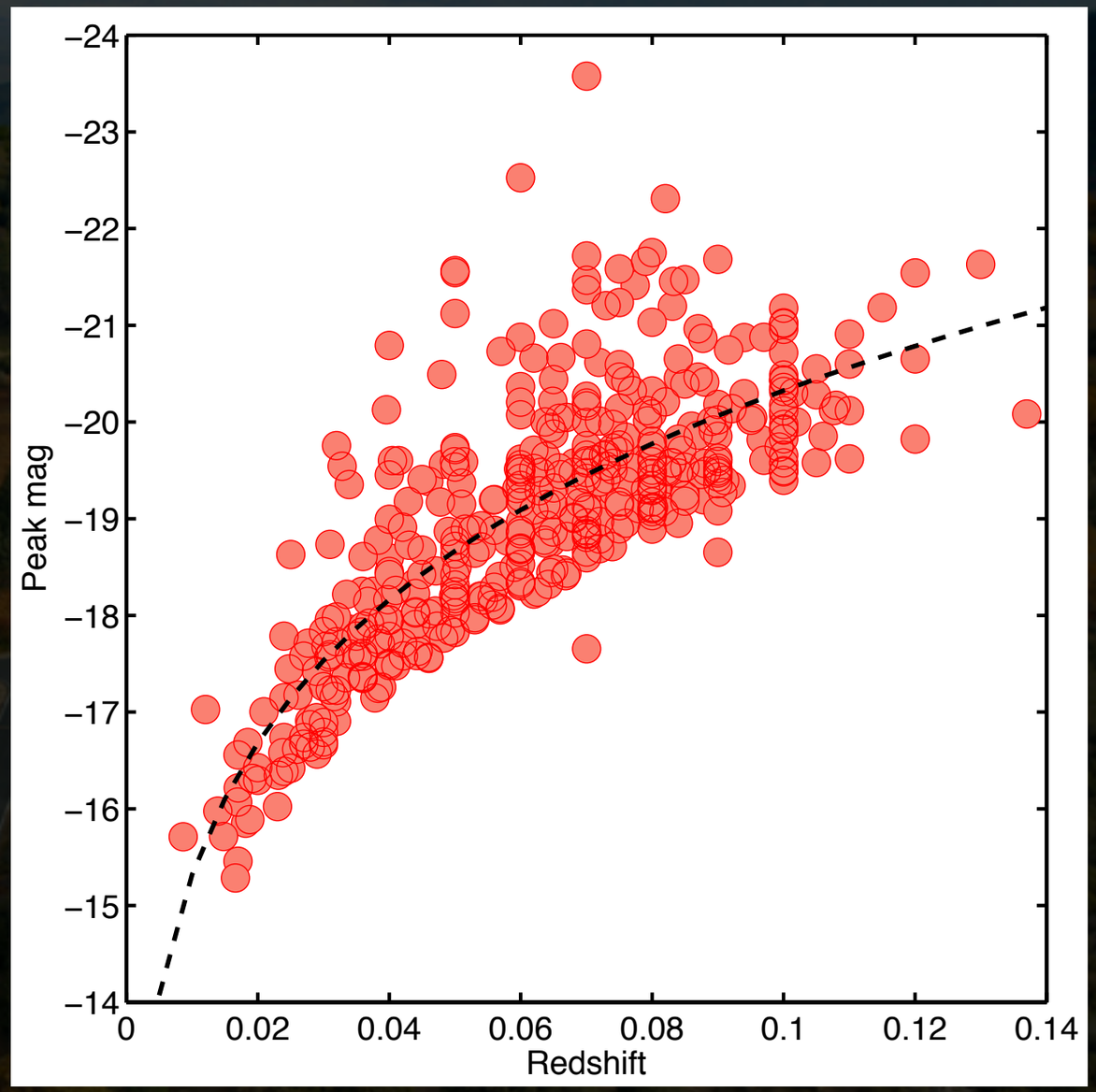

The ZTF Bright Transient Survey (BTS)

BTS preliminary results

Redshift completeness factor, RCF

The fraction of SNe discovered in galaxies with previously known redshifts

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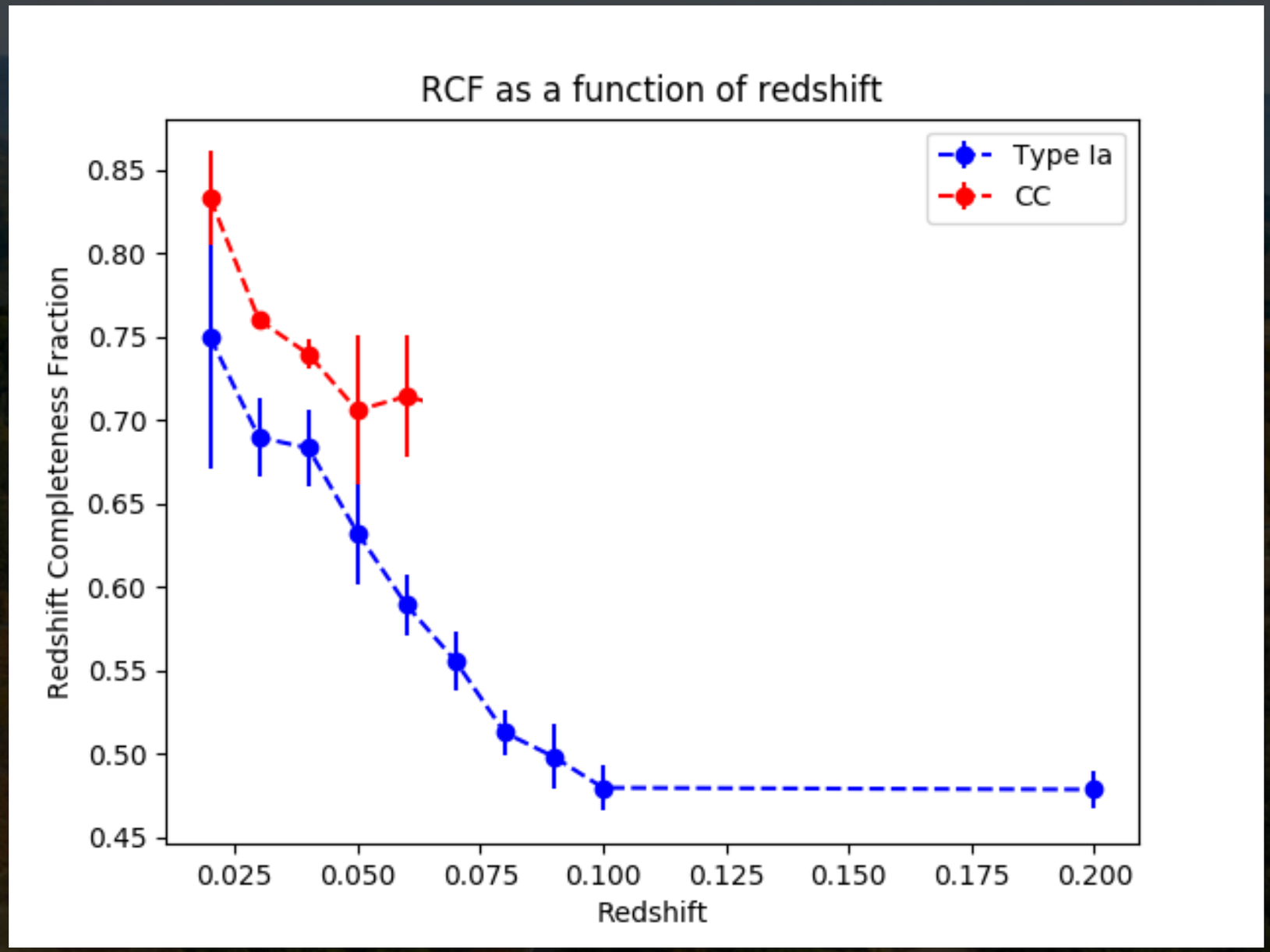

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