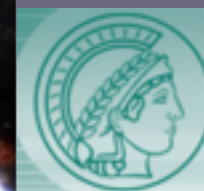


ePESSTO+: survey and scientific output (the advanced Public ESO Spectroscopic Survey of Transient Objects)

Janet Ting-Wan Chen on behalf of ePESSTO+ collaboration
Alexander von Humboldt Fellow
Max Planck Institute for Extraterrestrial Physics



MAX-PLANCK-INSTITUT
FÜR EXTRATERRESTRISCHE PHYSIK

ePESSTO+

- The advanced (extended) **P**ublic **E**SO **S**pectroscopic **S**urvey of **T**ransient **O**bjects
- **137** scientists in ePESSTO+ collaboration
- From P103 to P105: 140 nights on ESO New Technology Telescope (**NTT**) at La Silla Observatory, Chile
- We use **EFOSC2** (ESO Faint Object Spectrograph and Camera) & **SOFI** (Son of ISAAC, a large field Infra-Red (1-2.5 micron) spectro-imager)



ePESSTO+ organisation

Science Board

- **Cosimo Inserra** (survey PI)
- **Joe Anderson** (SB Chair)
- **Ting-Wan Chen** (TAT Chair)
- **Maria Teresa Botticella**
- **Michel Dennefeld**
- **Avishay Gal-Yam** (ZTF point of contact)
- **Giorgos Leloudas**
- **Kate Maguire**
- **Rubina Kotak**
- **Stephen Smartt** (ATLAS and PS point of contact)
- **Stefan Taubenberger**
- **Lukasz Wyrzykowski** (OGLE point of contact)

**27 science
projects**

ePESSTO+ organisation

Operating team

- **Dave Young** - Marshall operations
- **Ofer Yaron** - data distribution via WISeREP
- **Shane Moran-Kelly & Eleonora Parrag**
- coordinators of photometric resources
- **Tomás Muller Bravo** - pipeline manager and phase 3 data manager
- **Erkki Kankare, Mariusz Gromadzki & Matt Nicholl**
- phase 3 and data release responsible(s)



@PESSTOsurvey

- **Charlotte Angus, Chris Frohmaier & Phil Wiseman**

Ombudspersons

- **Patricia Shady & Lluís Galbany**

Classification machine

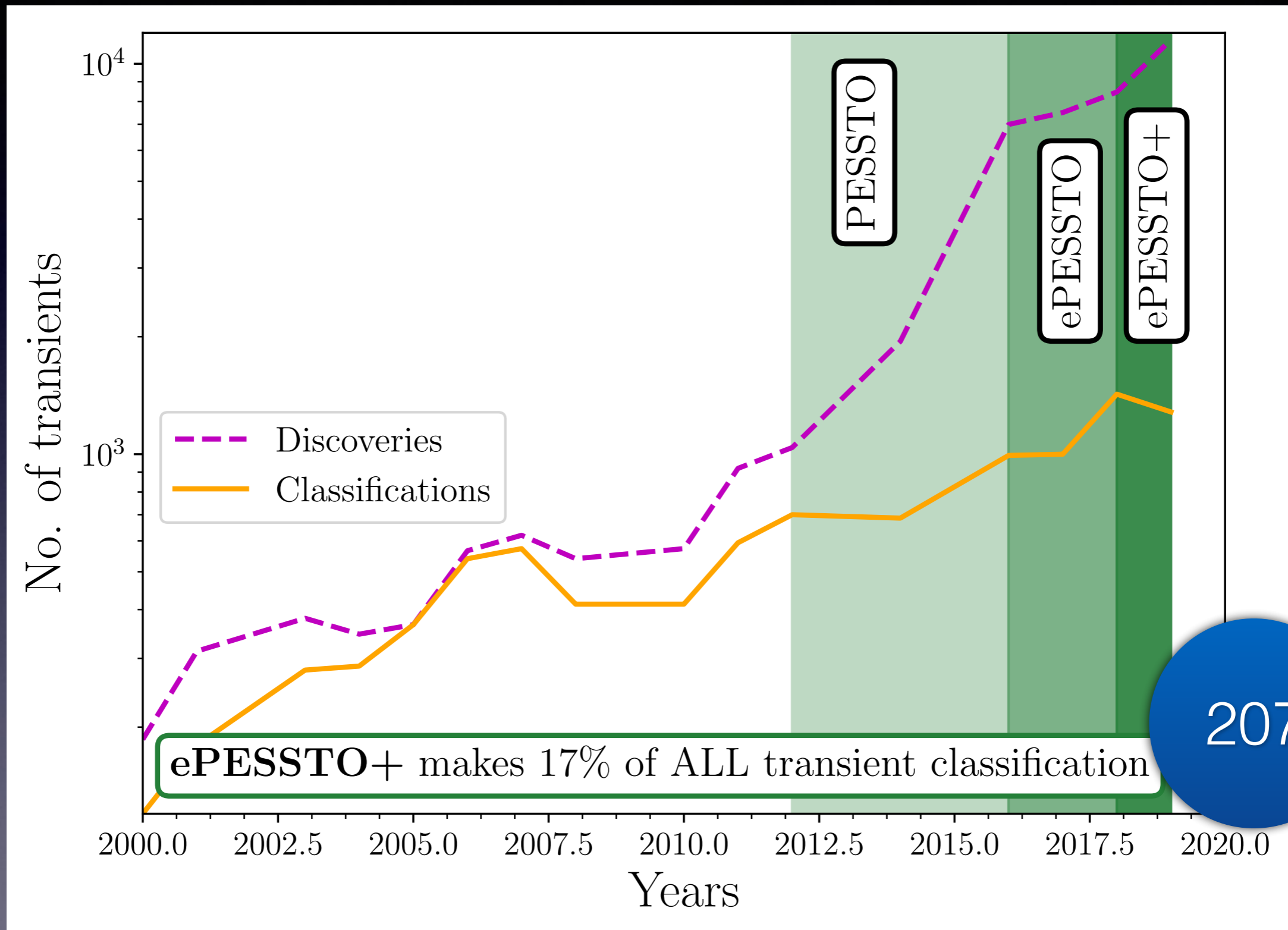


figure from Cosimo Inserra

Classification machine

Breakdown of the source of targets for ePESSTO+

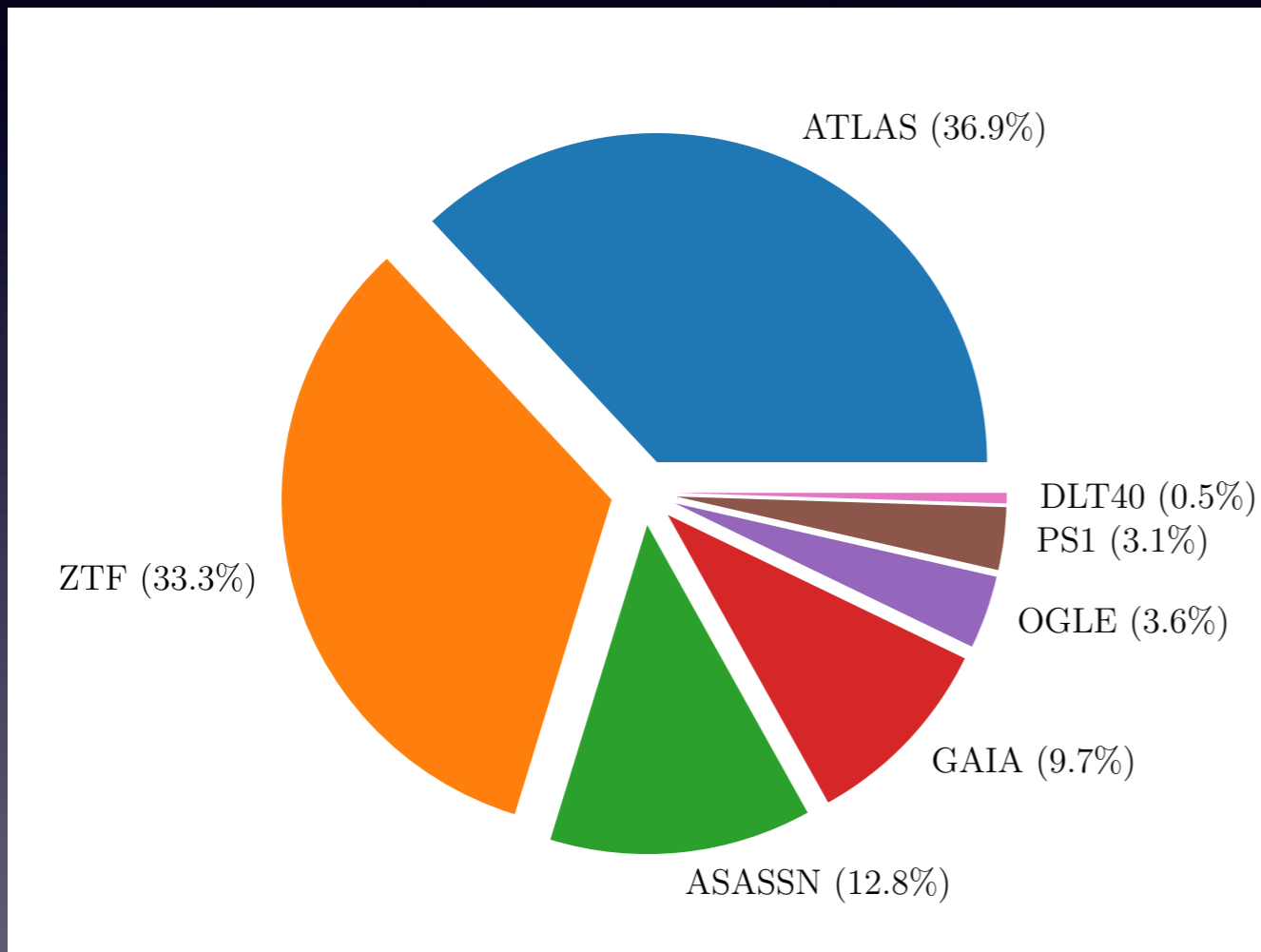
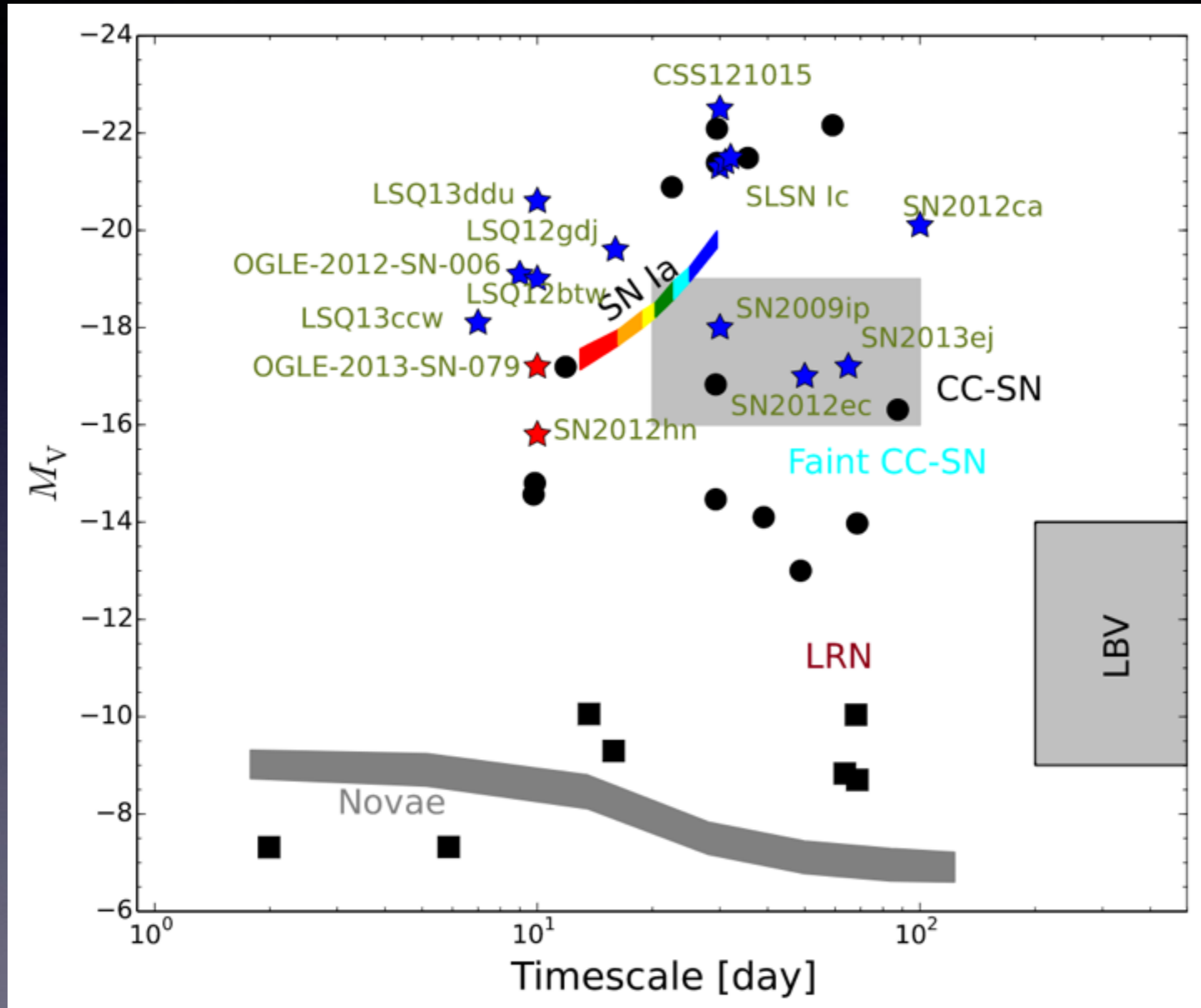


figure from Cosimo Inserra

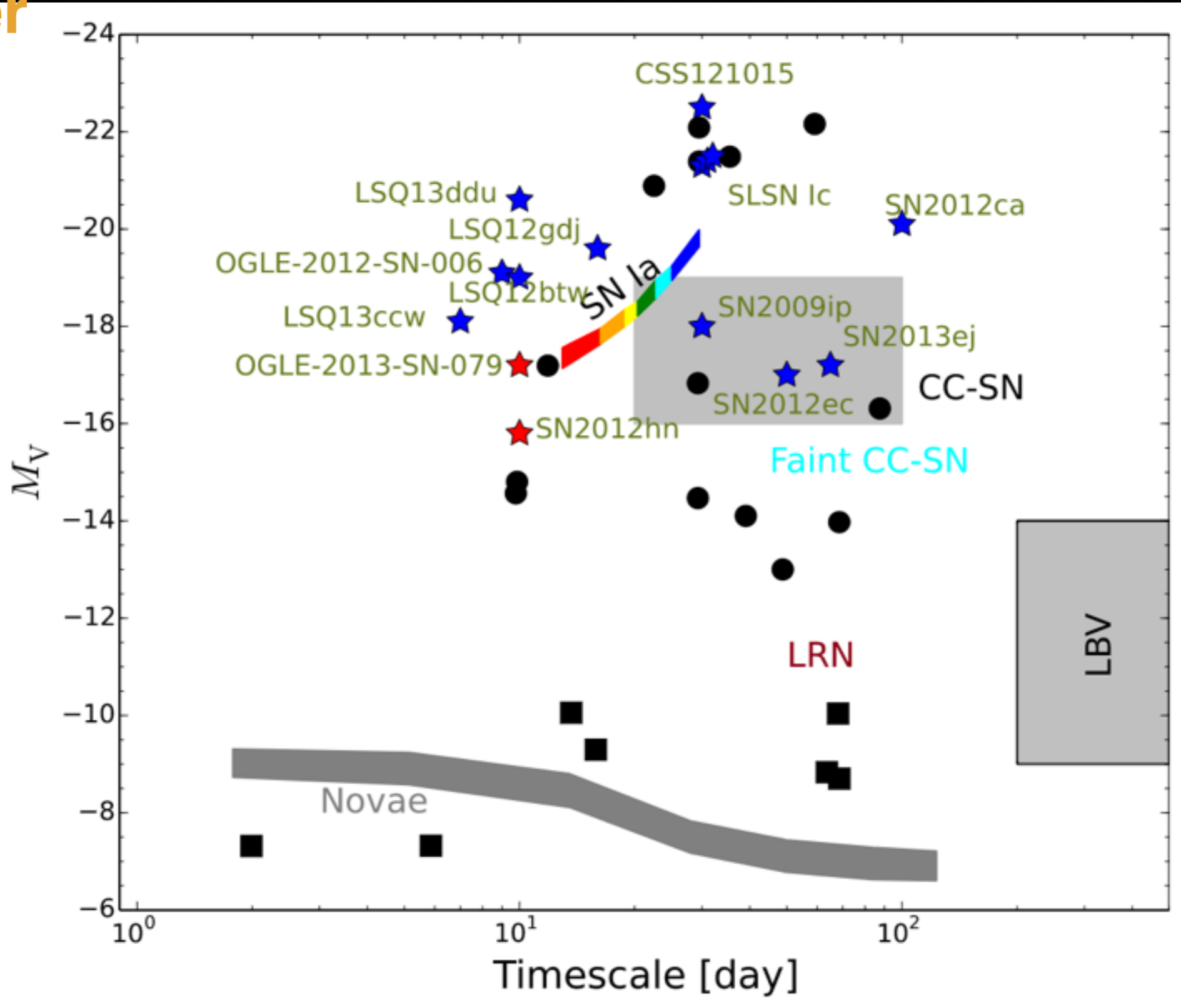
Type	Number	Per Cent
Ia	95	46
Ia-pec	8	4
II	35	17
Ib/c	6	3
Ic-BL	4	2
IIn	7	3
Ilb	3	2
Ibn	1	1
SLSNe	3	1
TDE	3	1
AGN	3	1
CV	11	5
Others	18	9
Not visible	10	5
Total	207	100

Transient space phase

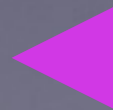


Transient space phase

brighter



faster

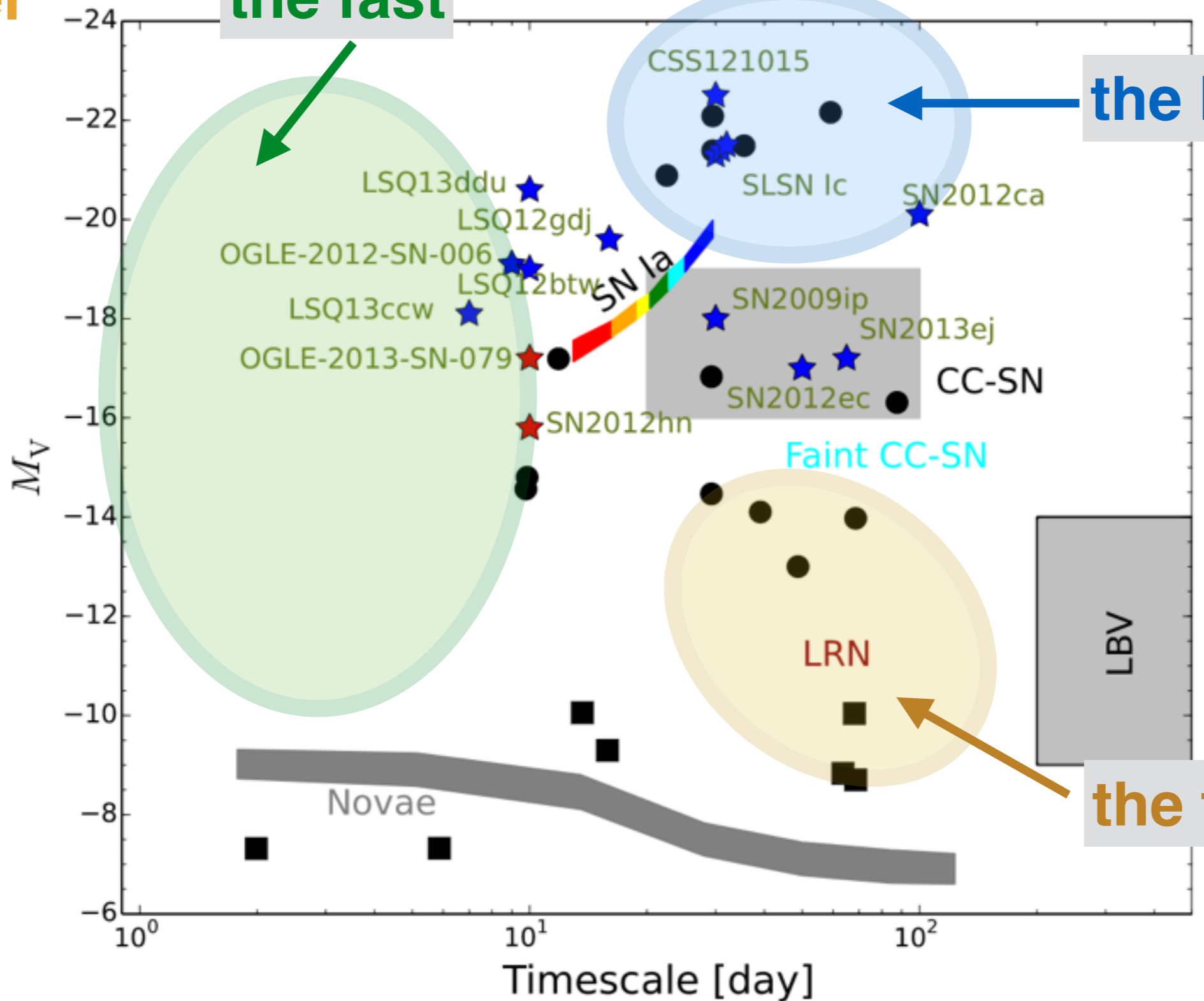


Transient space phase

brighter

the fast

the bright



the faint

faster

ePESSTO+ X GROND

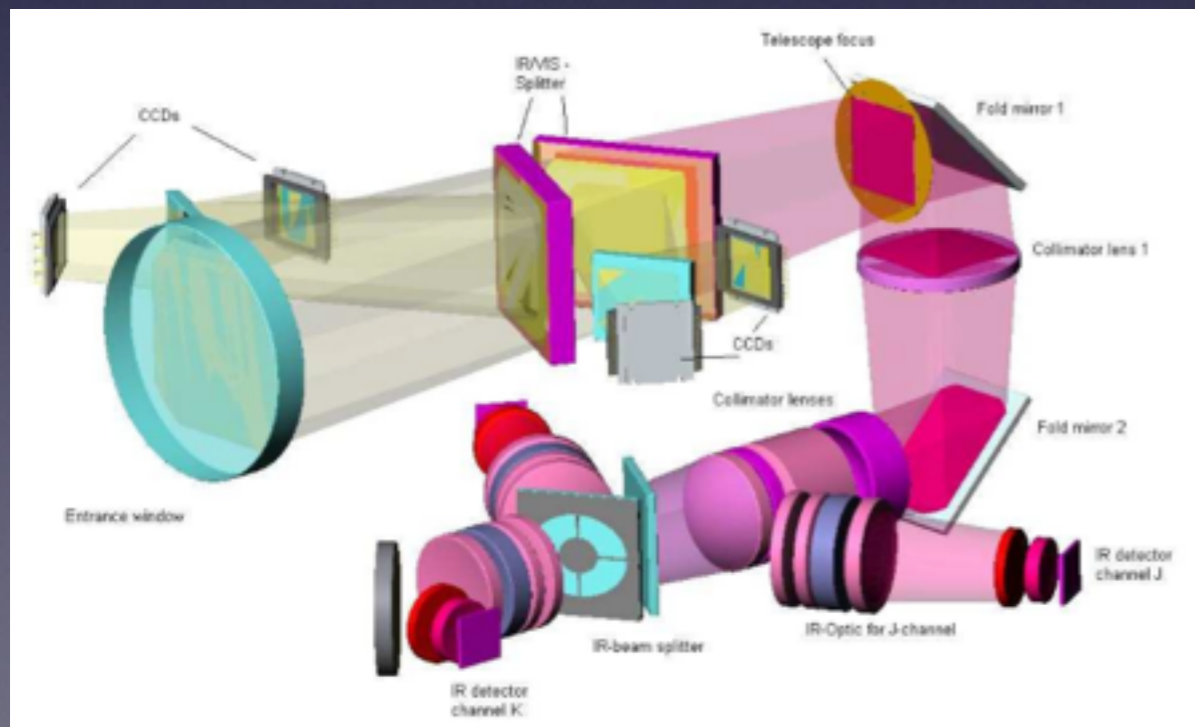
- GROND: **G**amma-**R**ay burst **O**ptical/**N**ear-infrared **D**etector

at the same site with NTT!

- 7-channel imaging
(simultaneous in g'r'i'z'JHK_s)
mounted at 2.2m MPG
telescope at ESO La Silla
observatory

- GROND SN programme (PI: Chen)
15% telescope time sharing with
other projects (e.g. GRB, X-ray
binary...)

- GROND follows up 60 SNe
collaborating with ePESSTO(+)
since Nov. 2016
- GREAT (**GROND-ePESSTO-
ATLAS**) survey identifies
2 SLSN II and 1 peculiar object



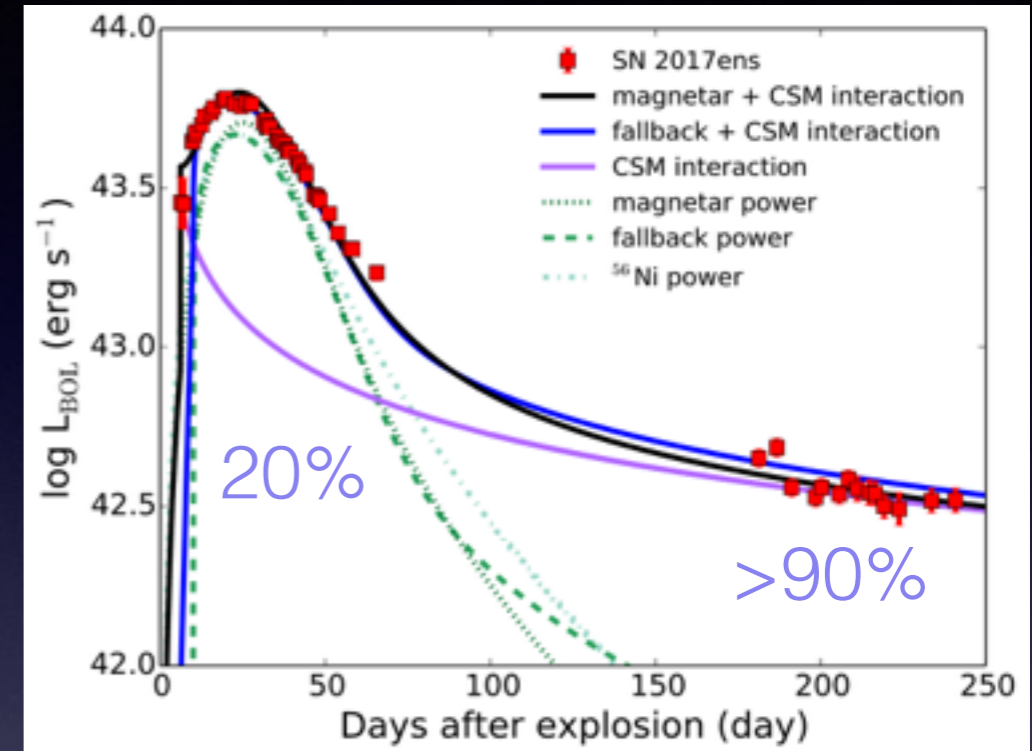
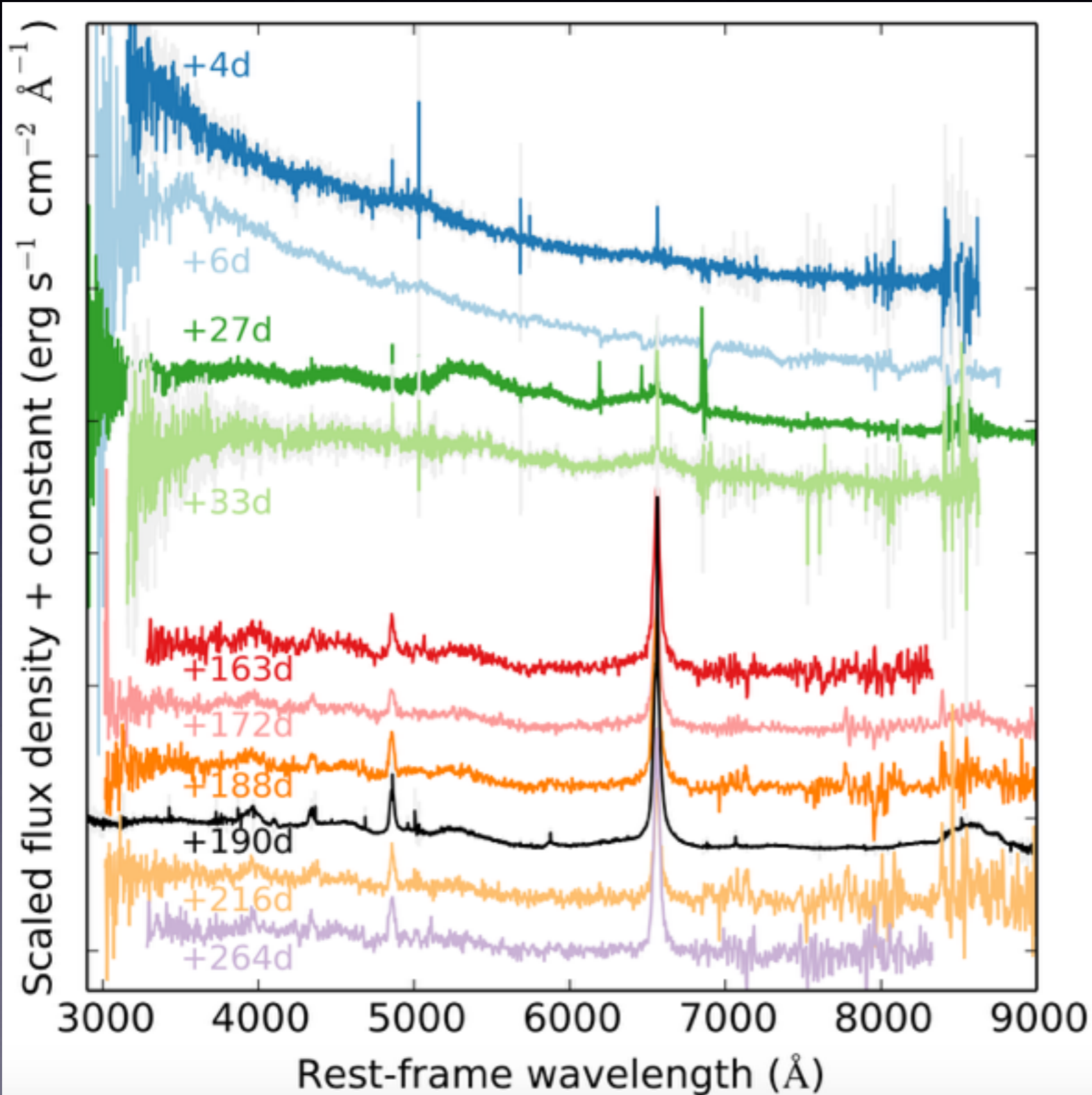
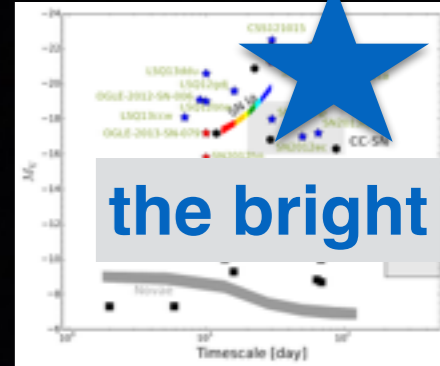
Greiner et al. 2008

SN 2017ens

redshift = 0.1086

$M_g = -21.1$ mag

(from luminous broad lined-Ic to II_n)



Chen et al. 2018, ApJ, 867L, 31

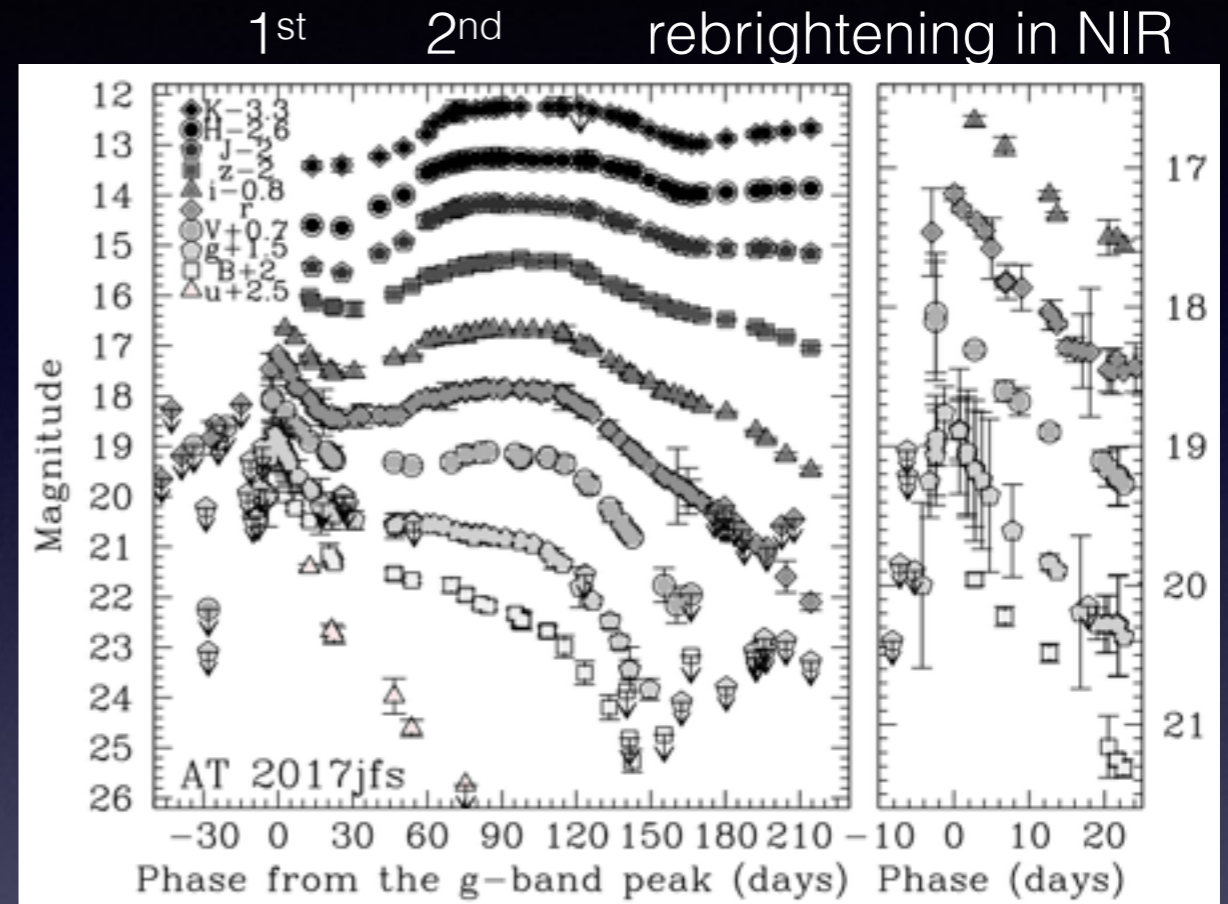
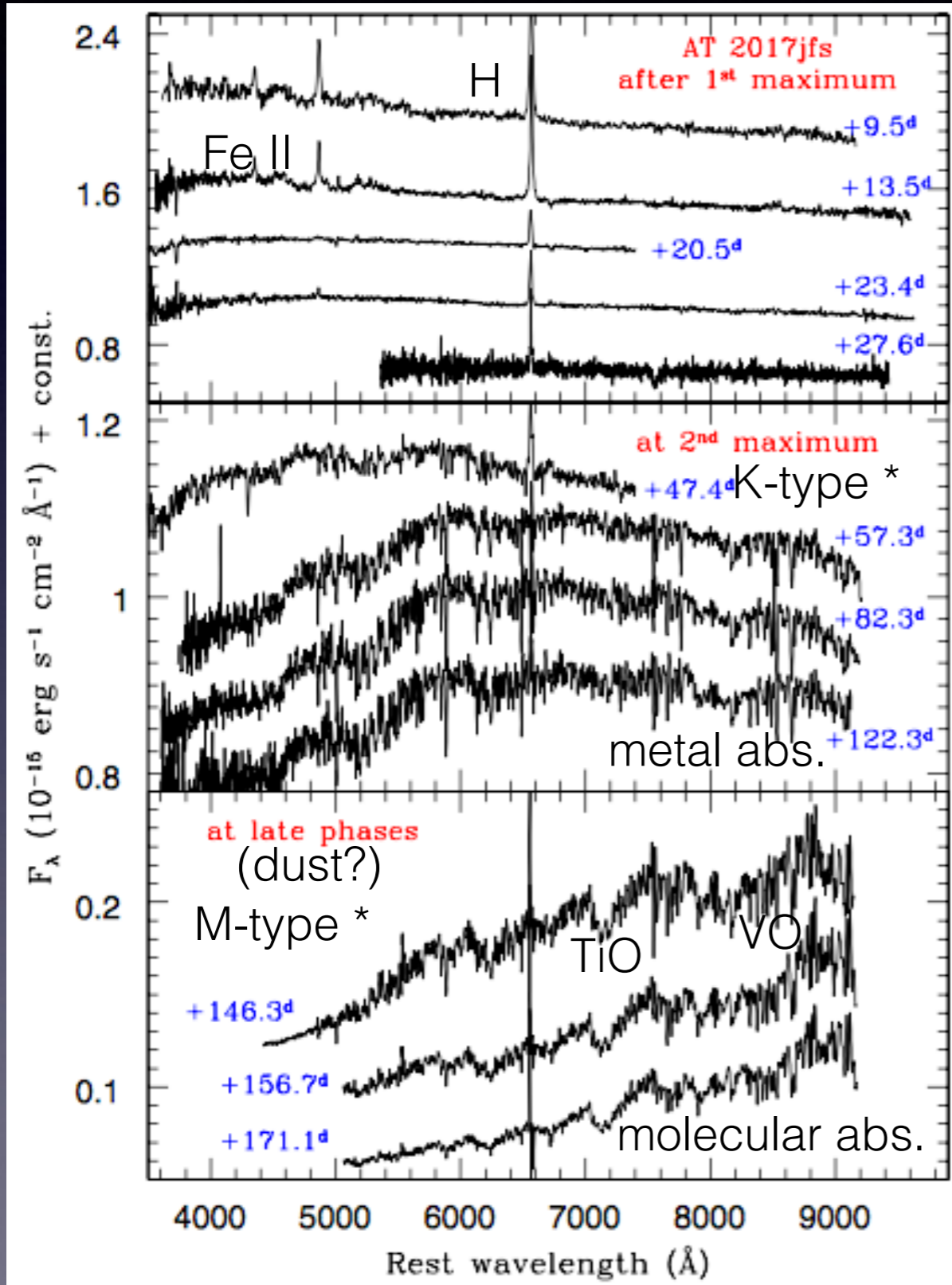
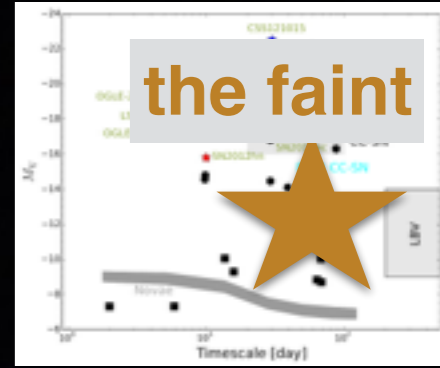
- Two components: central power and interaction.
- The mass loss rate of $5 \times 10^{-4} M_{\odot}/\text{yr}$ with the constant wind of 50 km/s

AT 2017jfs

(luminous red nova)

distance = 35 Mpc

$M_g = -15.5$ mag



Pastorello, Chen et al. 2019,
A&A, 625L, 8

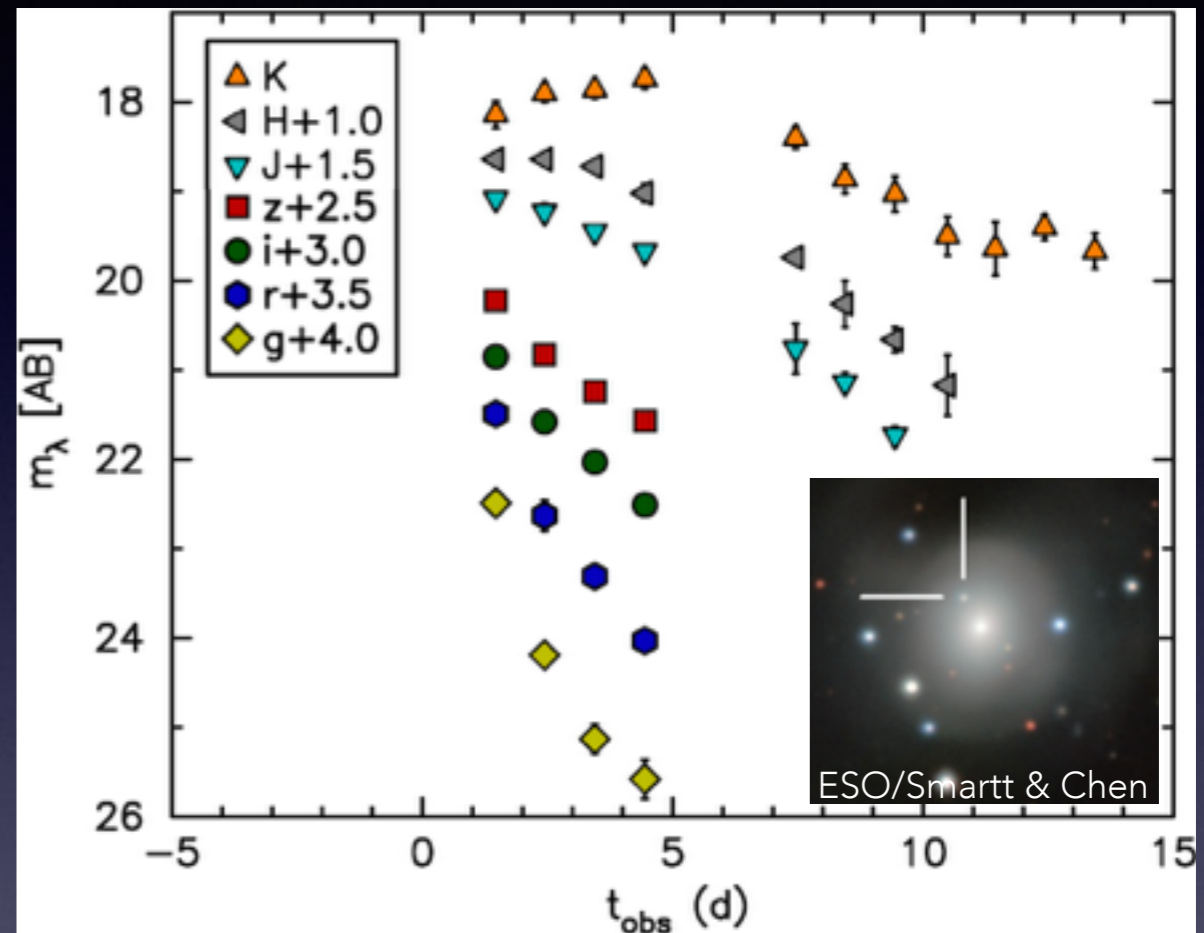
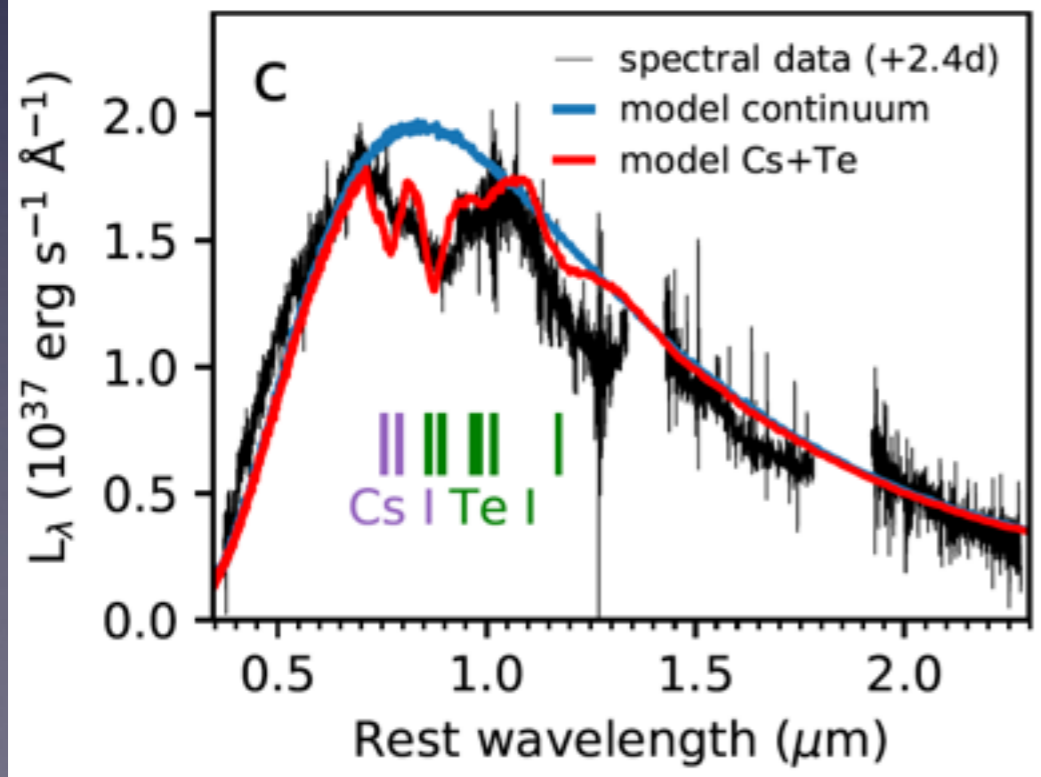
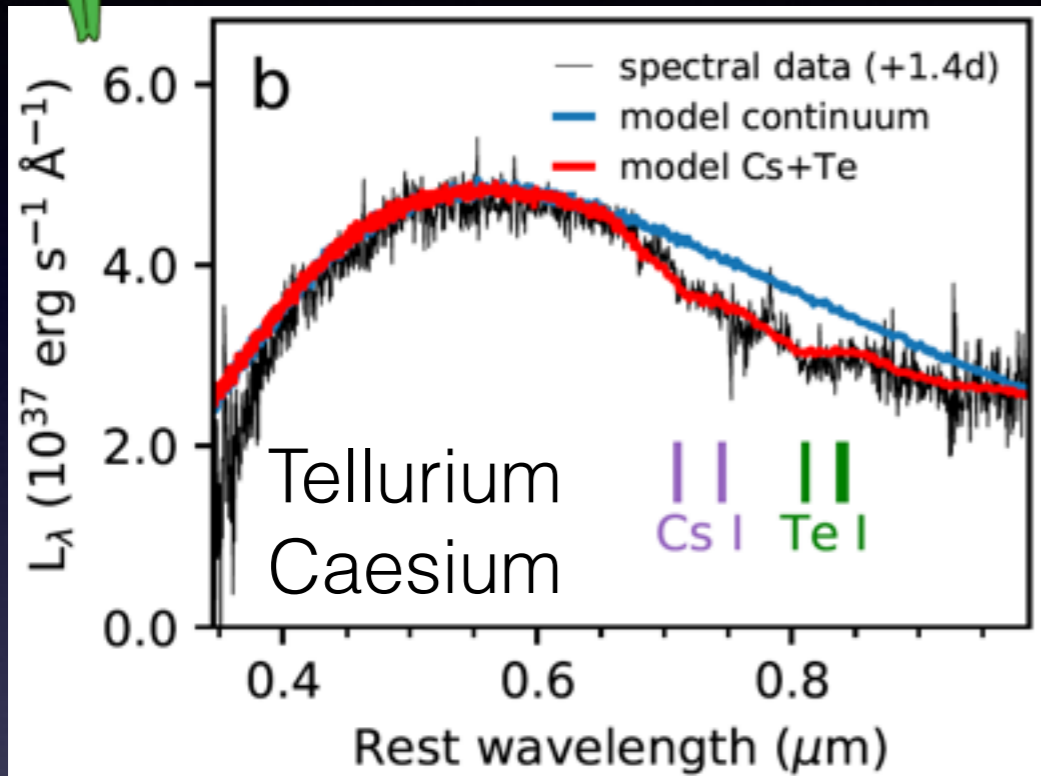
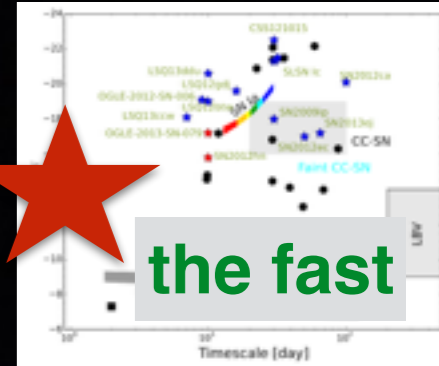
- common-envelope transient, possibly the outcome of a merging event in a massive binary



AT 2017gfo

distance = 44 Mpc
 $M_r = -15.8$ mag

(kilonova, GW 170817)



Smartt, Chen et al. *Nature*, 2017, 551, 75

The power source is constrained to have a power law slope of $\beta = -1.2^{+0.3}_{-0.3}$ consistent with radioactive powering from r-process nuclides



AT 2018cow

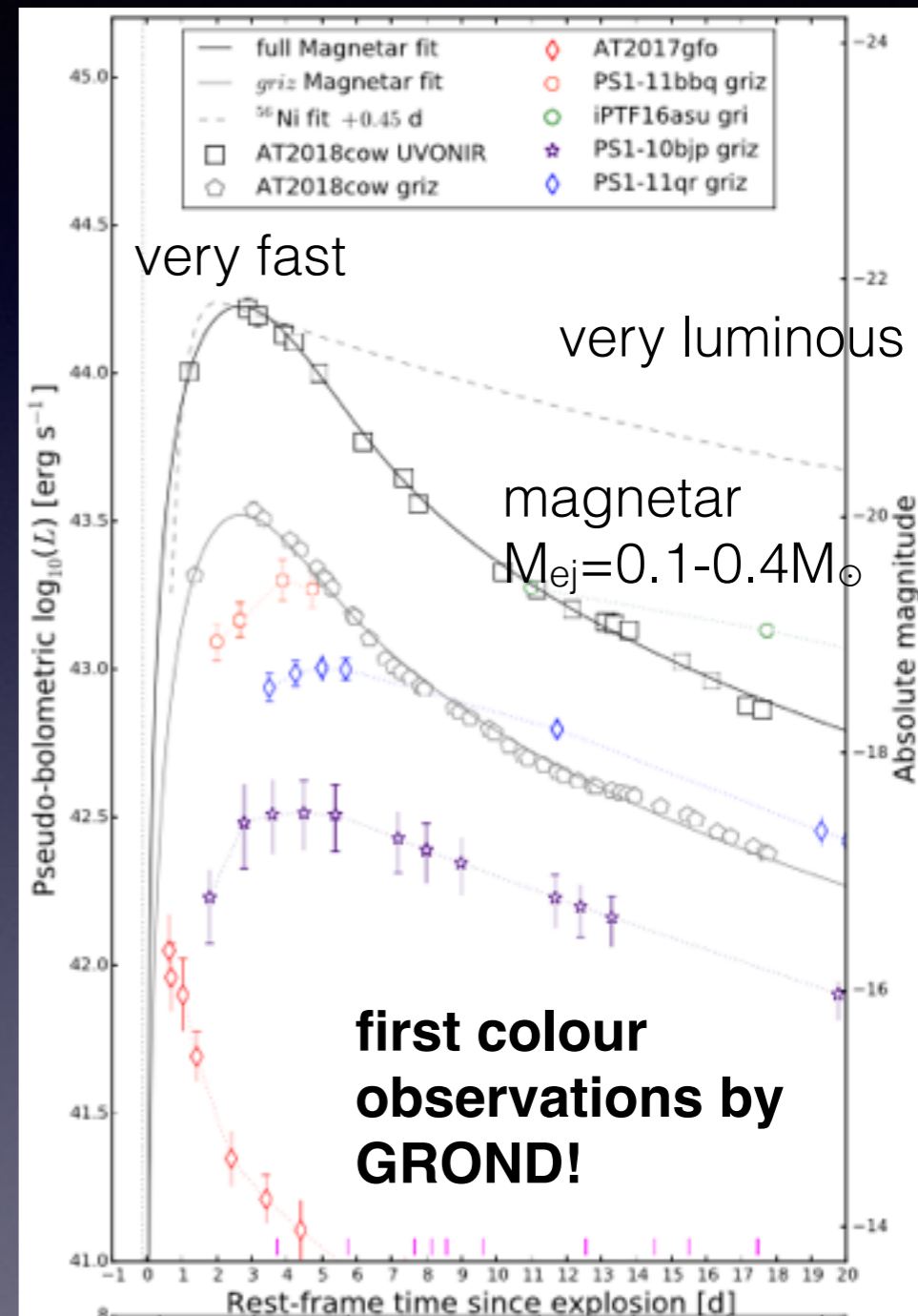
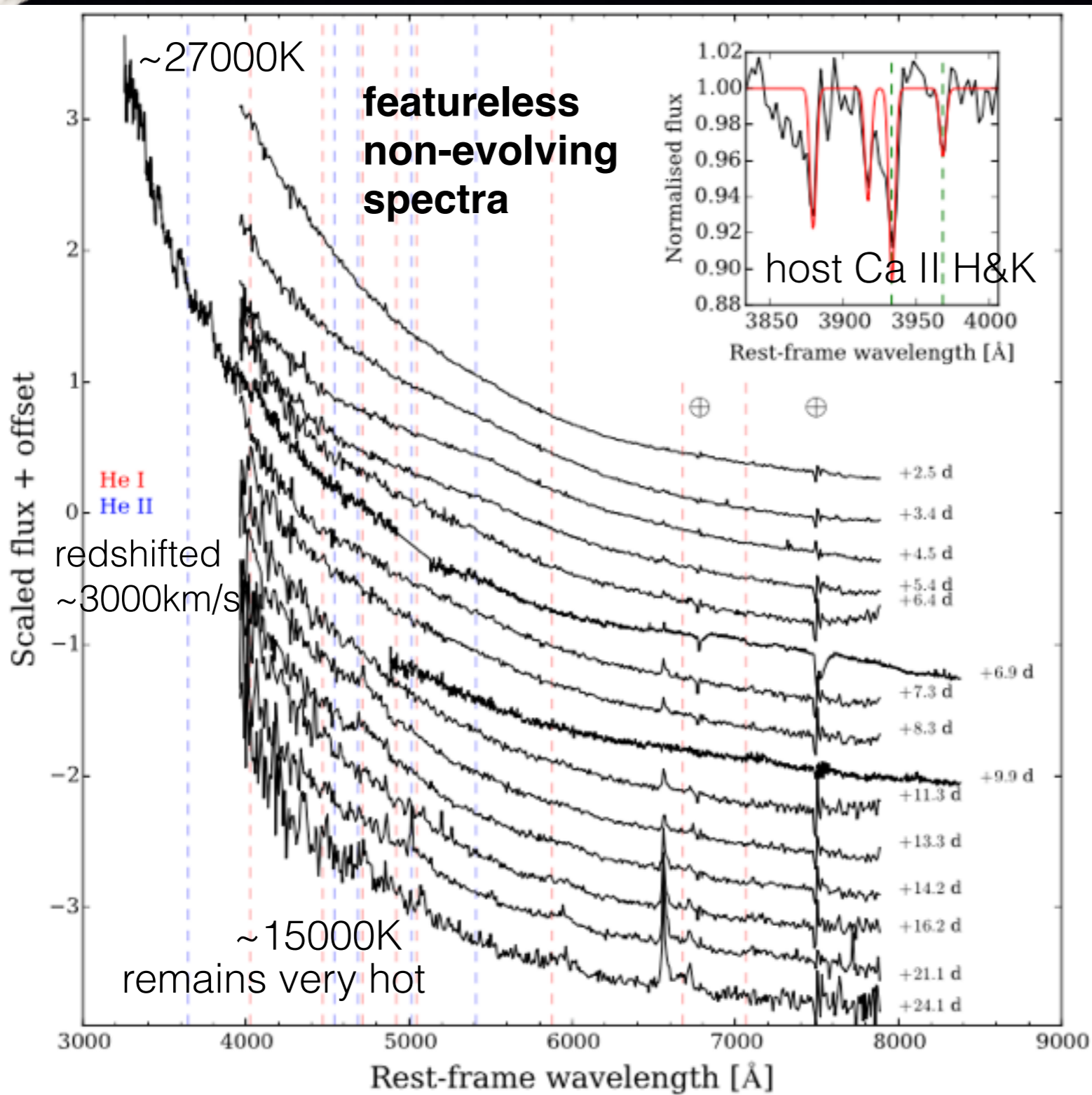
(SN? NS merger? TDE?)

distance = 66 Mpc

$M_g = -20.4$ mag



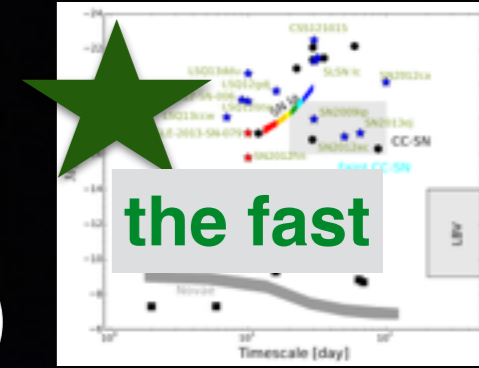
intermediate-mass BH



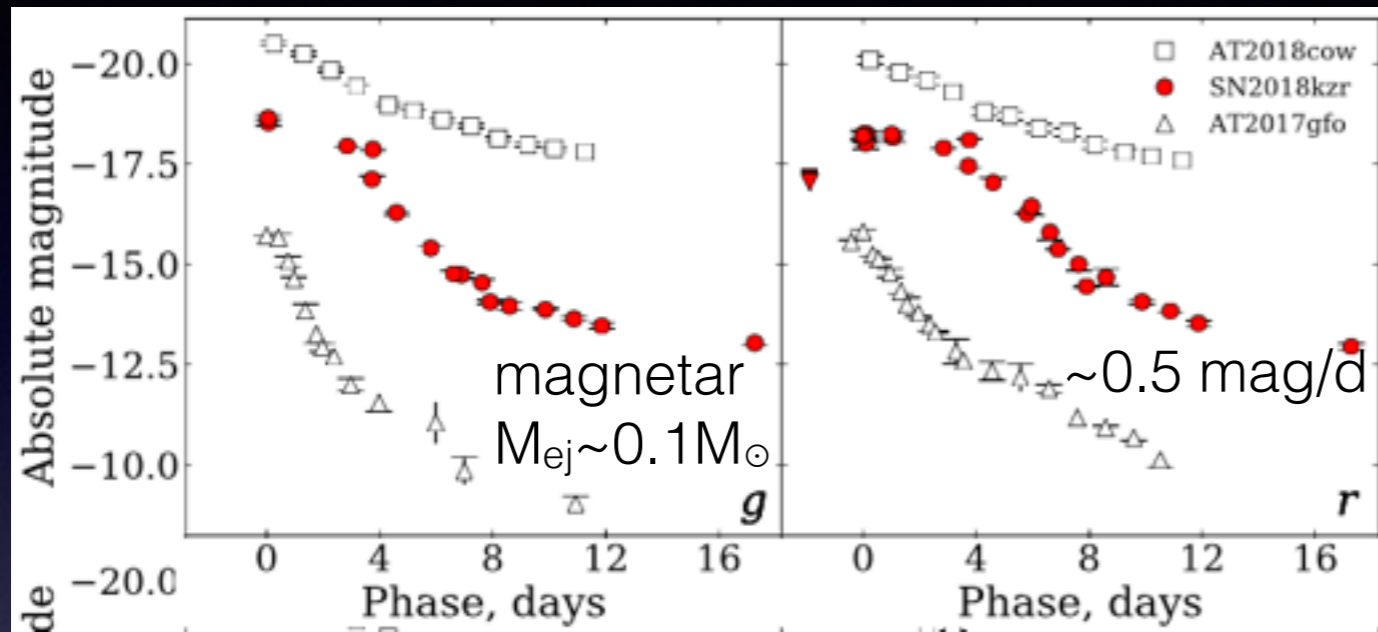
Prentice et al. 2018, ApJ, 865L, 3

SN 2018kzr

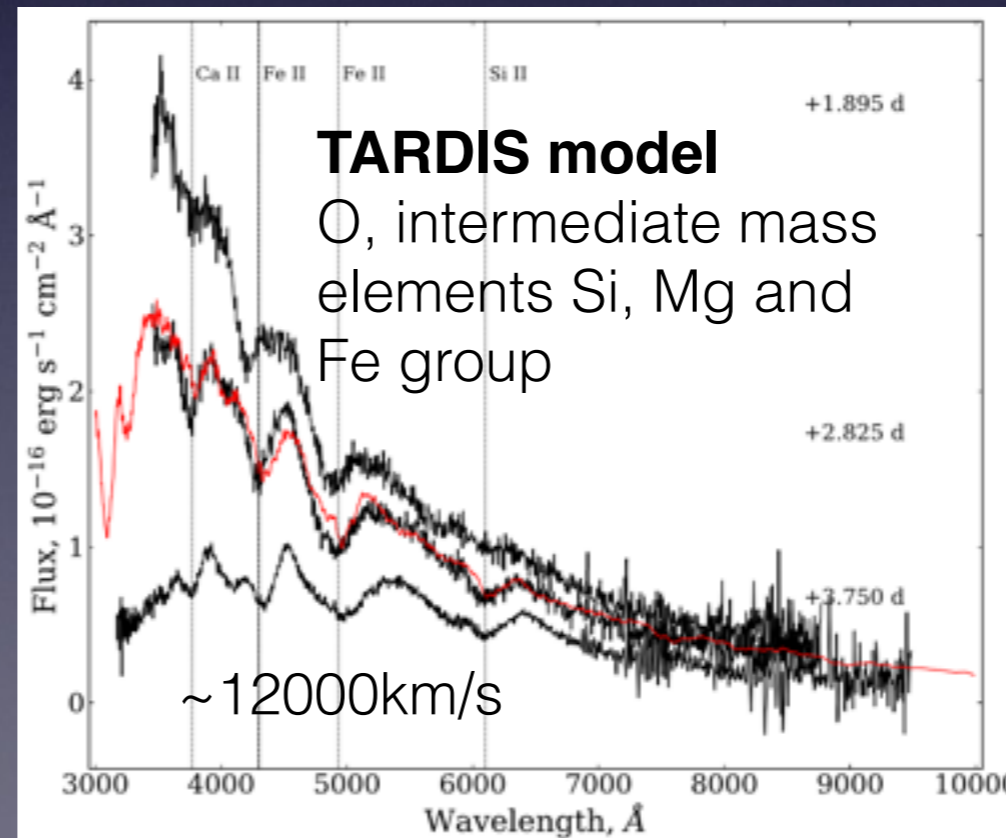
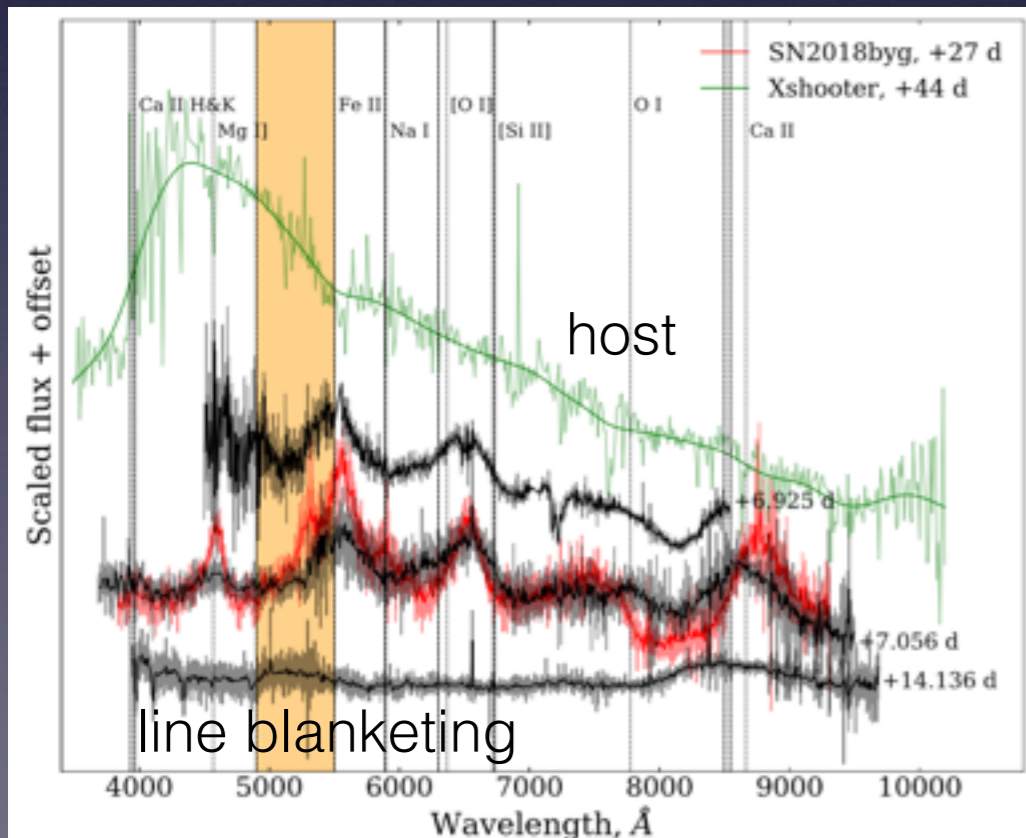
distance = 44 Mpc
 $M_r = -18$ mag



(the fastest declining SN-like transient)



- alternative input energy source: the accretion induced collapse with magnetar powering or a WD - NS merger with energy from disk wind shocks
- further quantitative modelling: Gillanders et al. in prep.

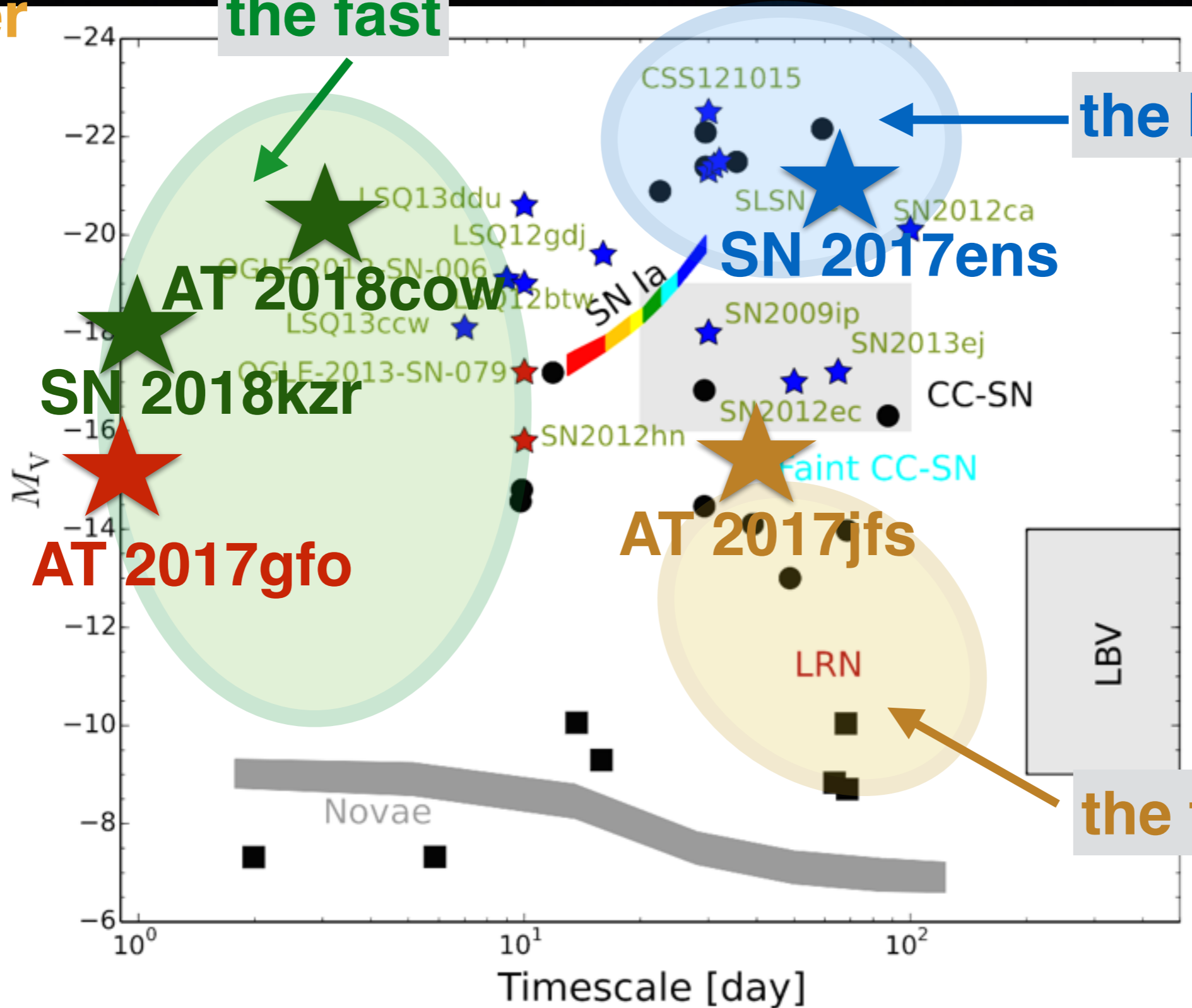


Transient space phase

brighter

the fast

the bright



AT 2018cow
SN 2018kzr

SN 2017ens

AT 2017gfo

AT 2017jfs

LRN

the faint

LBV

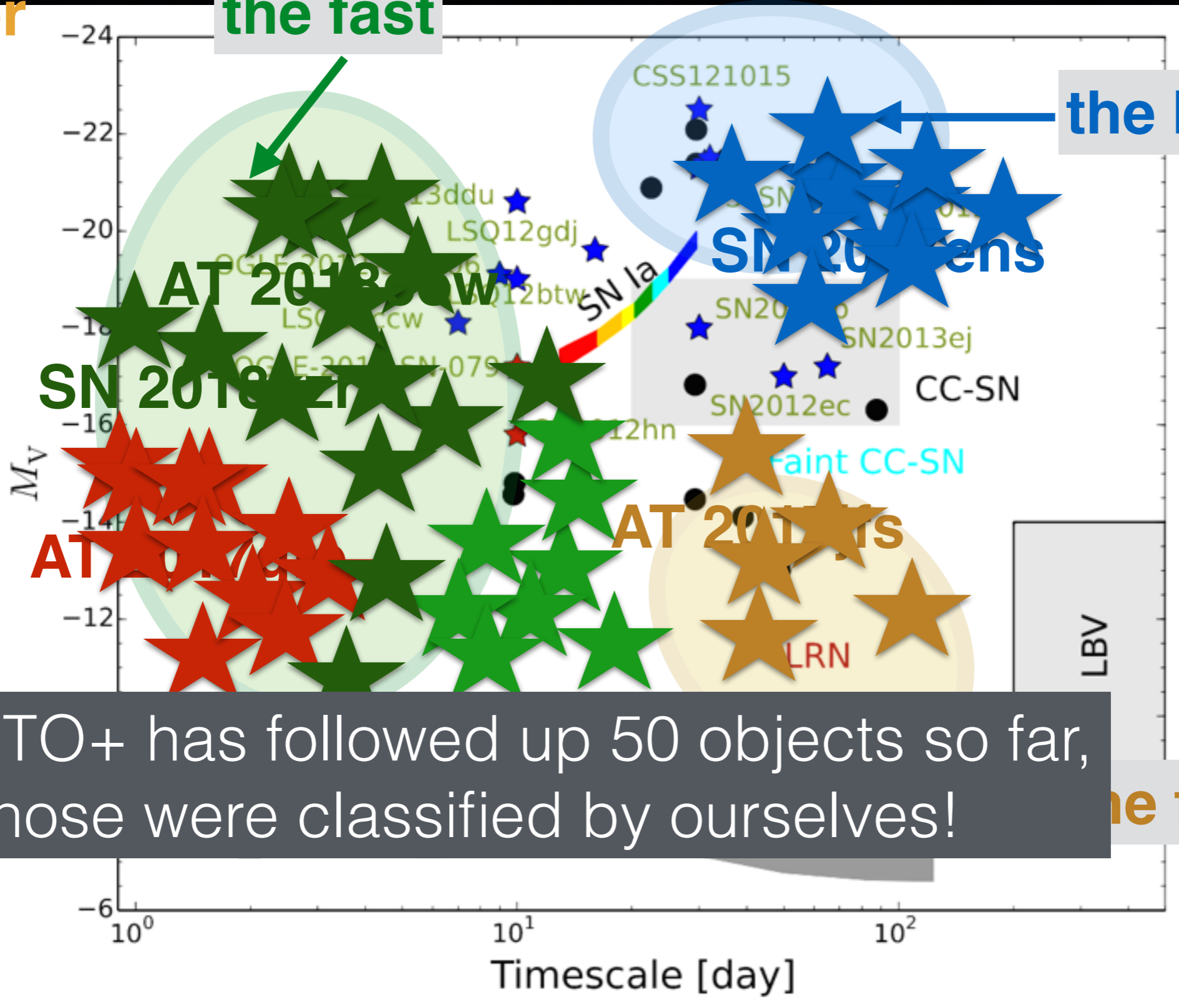
Novae

Transient space phase

brighter

the fast

the bright



ePESSTO+ has followed up 50 objects so far,
22 of those were classified by ourselves!

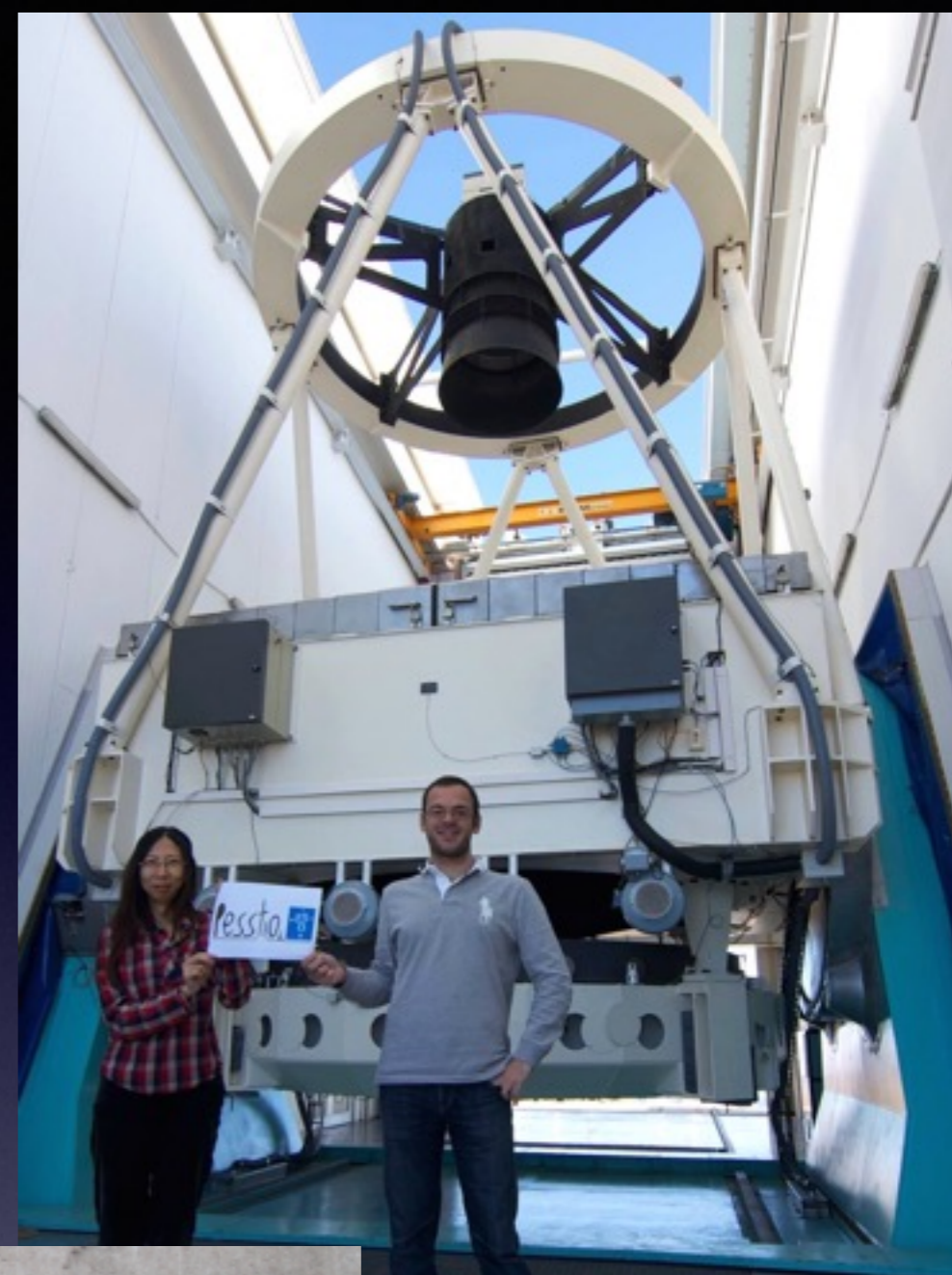
the faint

faster



Dankeschön!

<http://www.pessto.org/>



@NTT, La Silla
09/2013



ePESSTO+ meeting @Turku, 04/2019