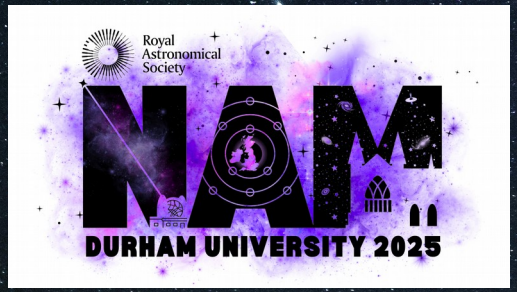
A study on late time UV-emission in core collapse supernovae

and its use on uncovering peculiar transients

Anne Inkenhaag, Peter G. Jonker, Andrew J. Levan, Morgan Fraser,
Joseph D. Lyman, Lluís Galbany, Hanindyo Kuncarayakti, Andrew Mummery



arXiv:2411.09690

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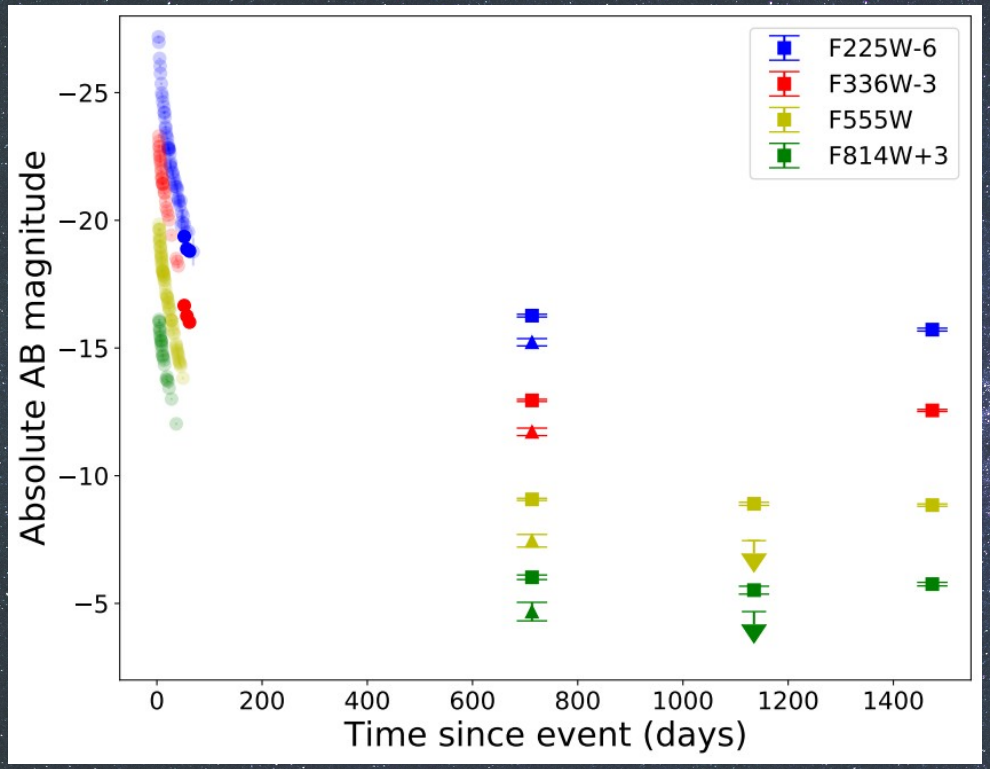
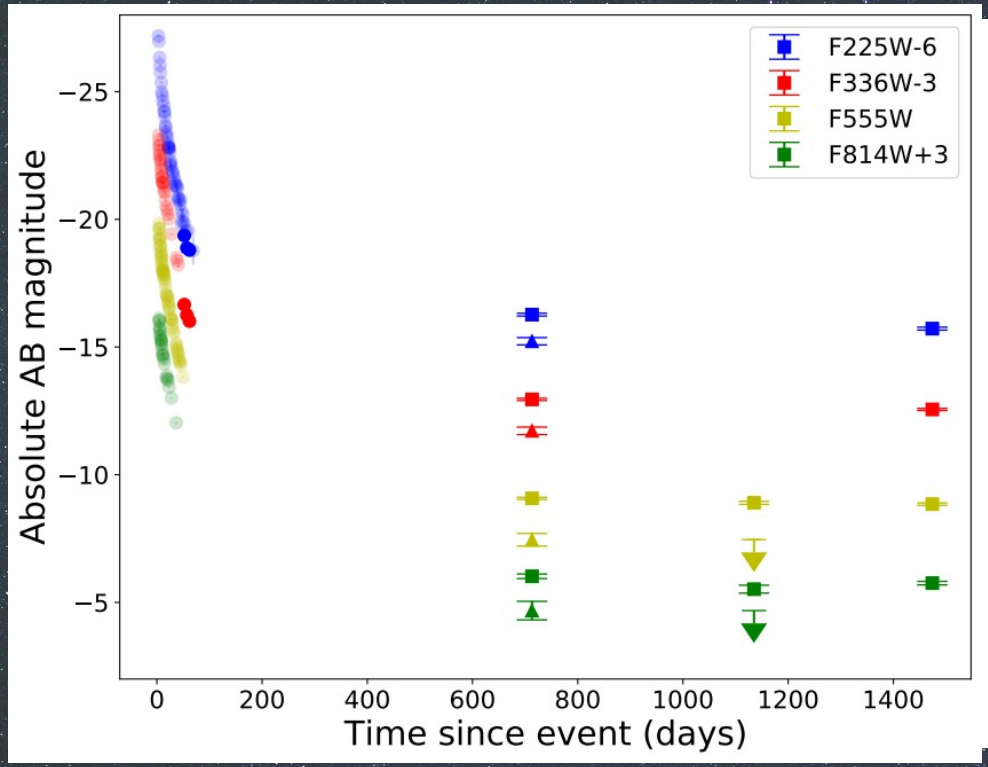
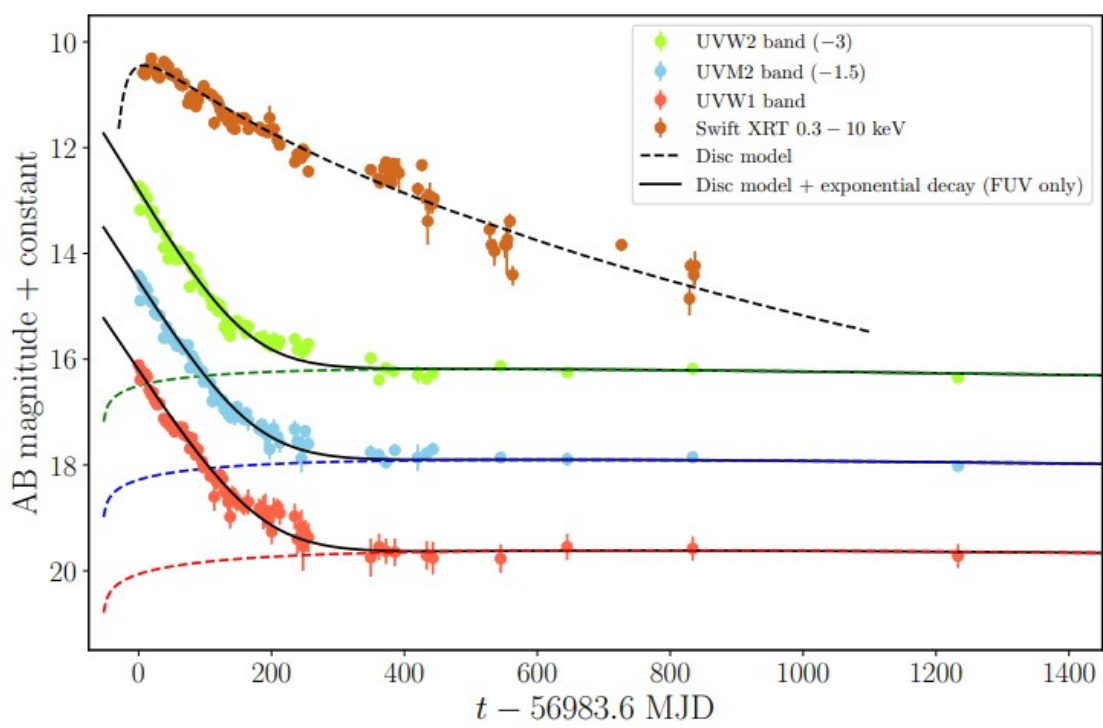
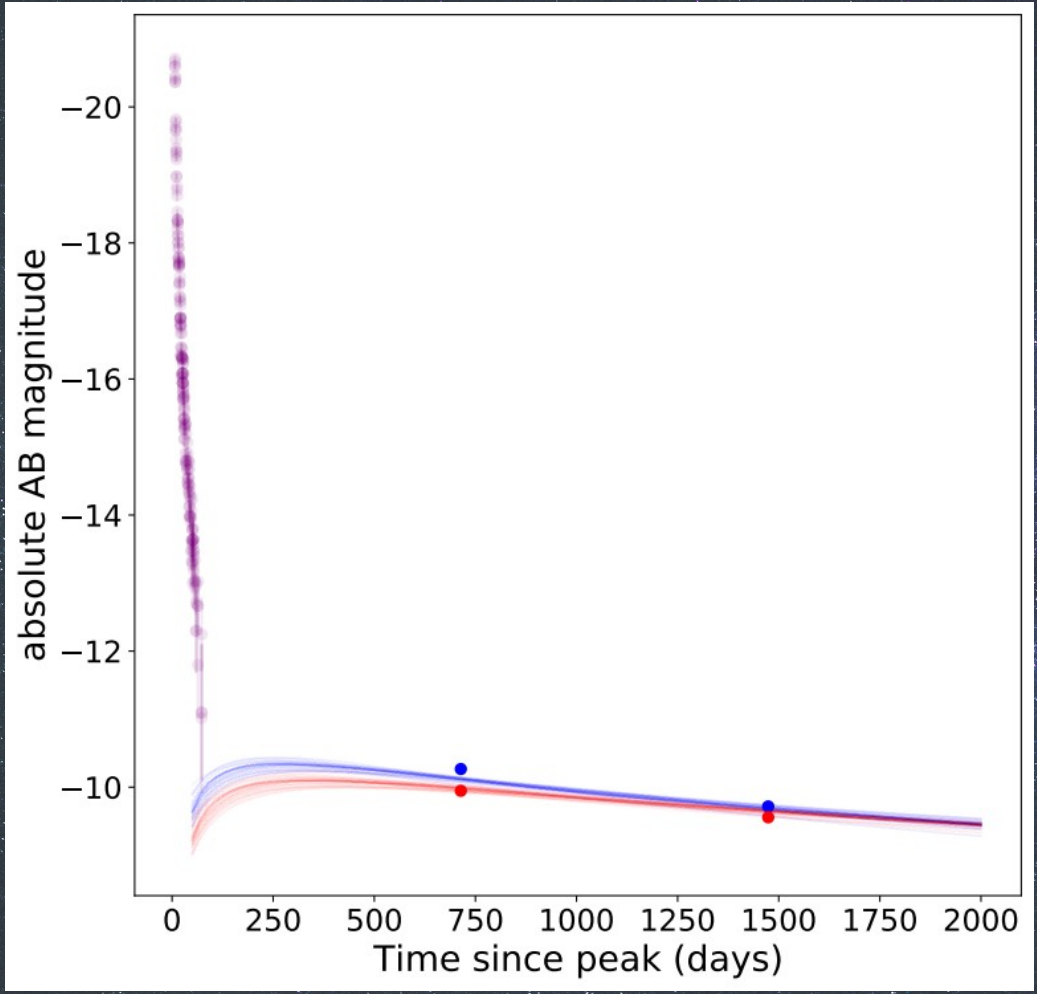

F225W-6
F336W-3
F555W
F814W+3
Absolute AB magnitude
−25
−20
−15
−10
−5
0
200
400
600
800
1000
1200
1400
Time since event (days)

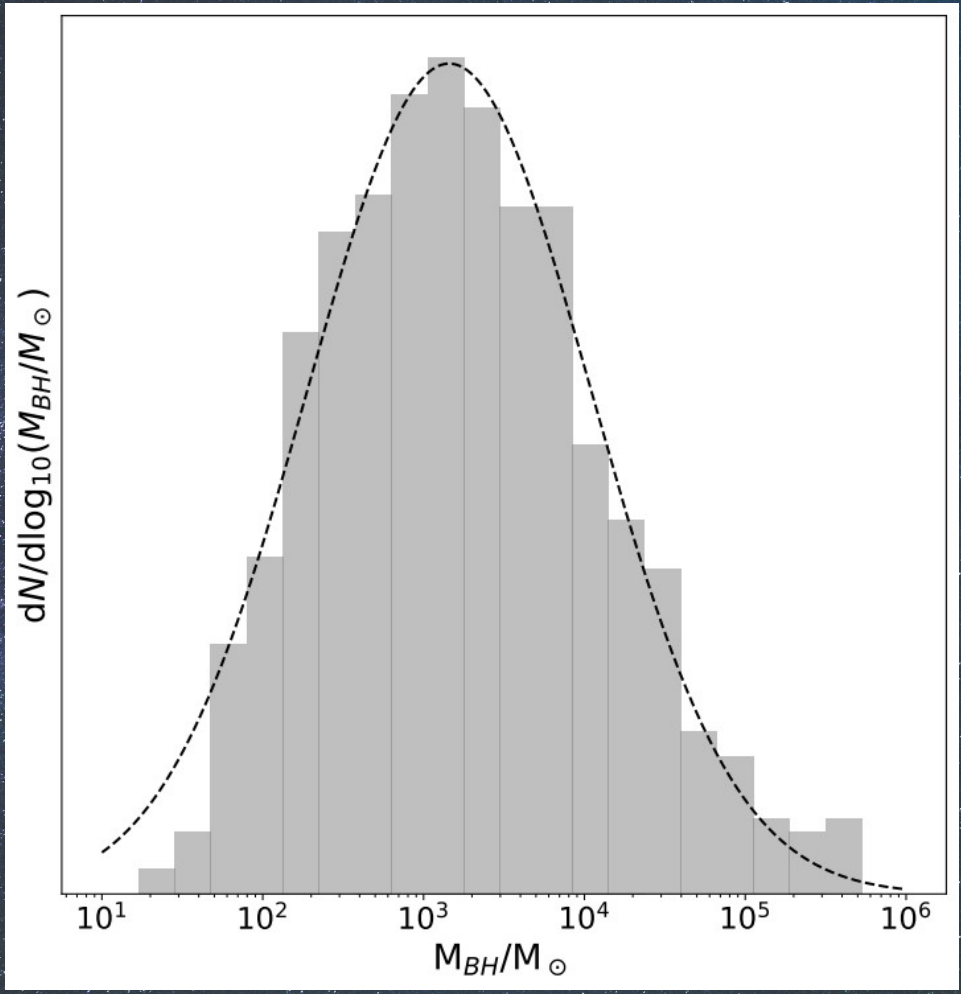
ASASSN-14li



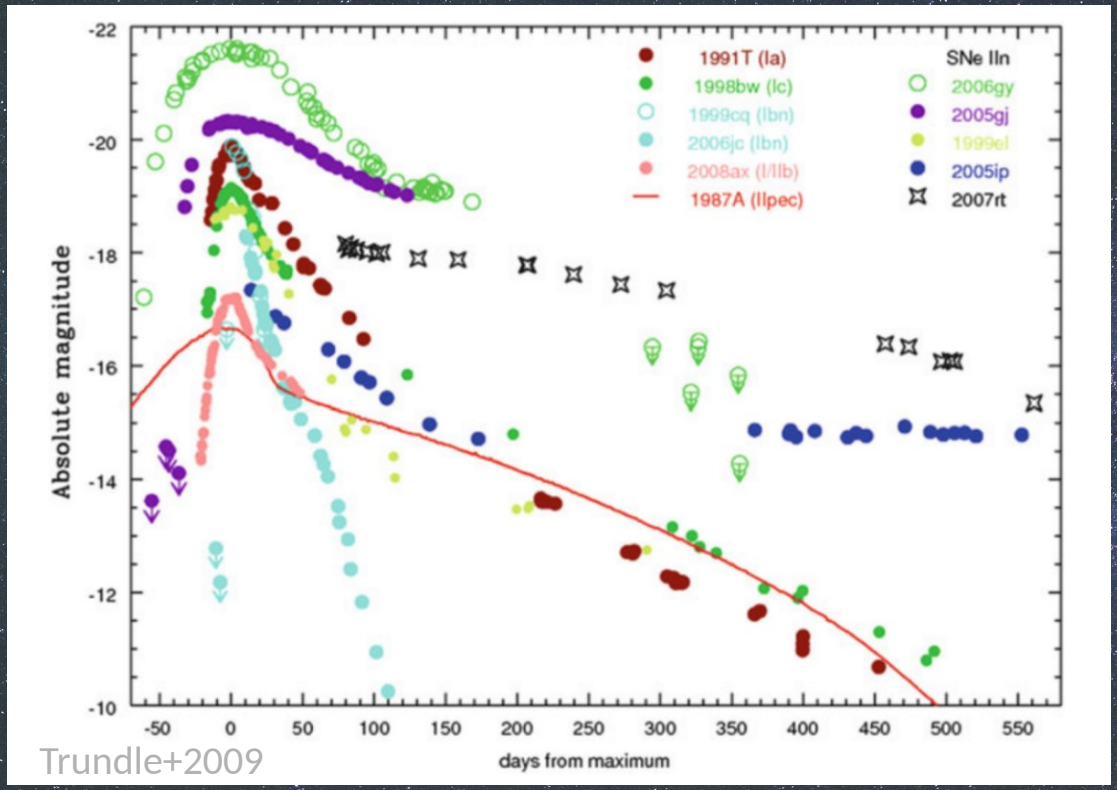


Mummery&Balbus,2020

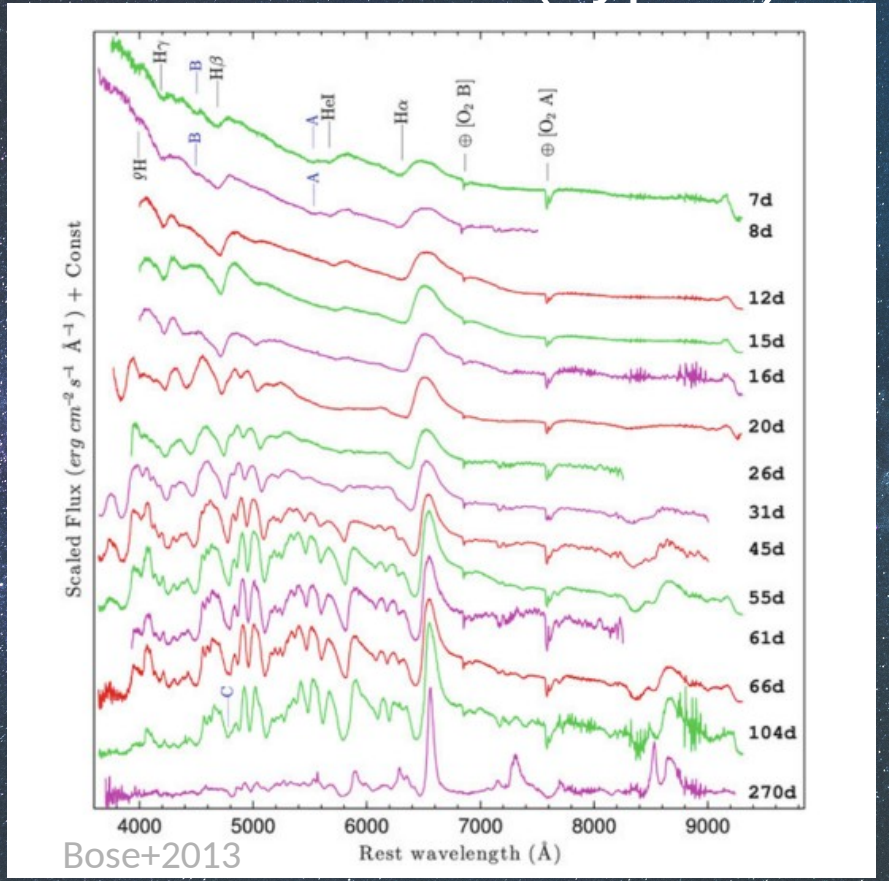

absolute AB magnitude
−20
−18
−16
−14
−12
−10
0
250
500
750
1000
1250
1500
1750
2000
Time since peak (days)


dN/dlog10(MBH/M⊙)
10^1
10^2
10^3
10^4
10^5
10^6
MBH/M⊙

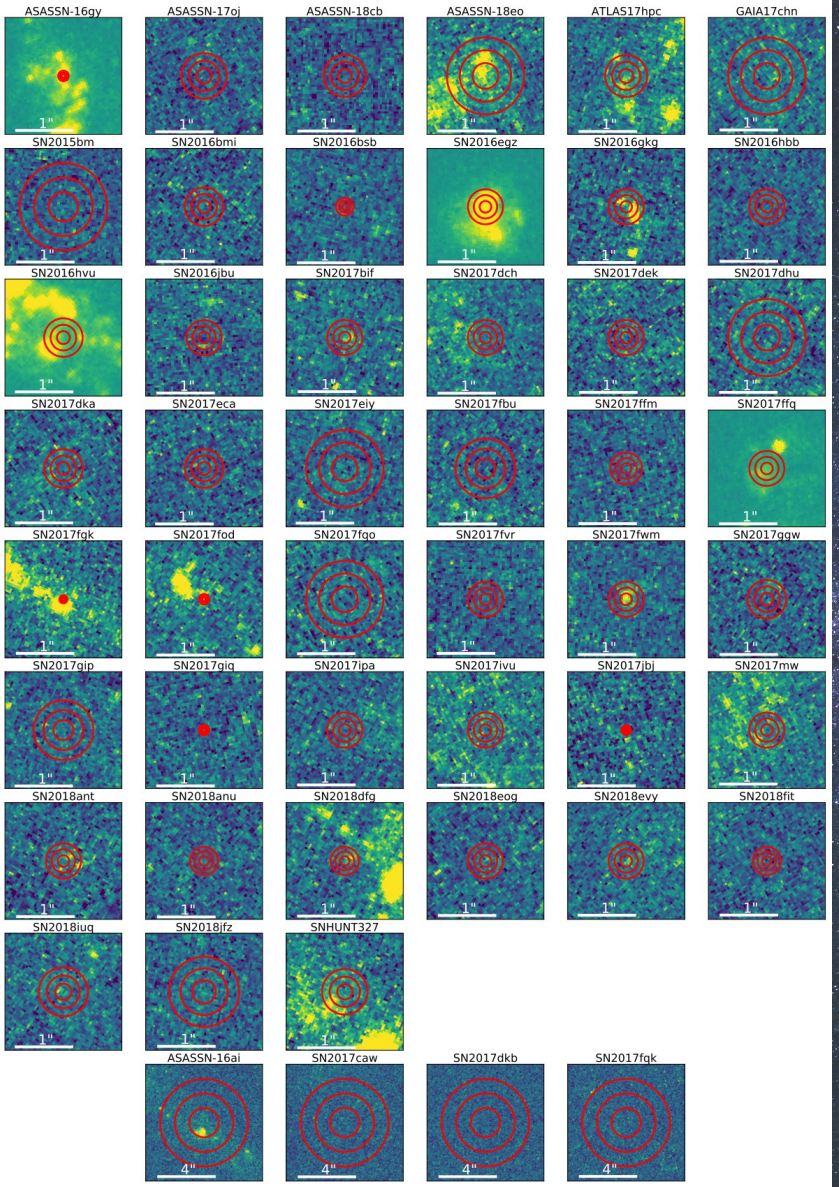
SN 2012aw (Type II)



Trundle+2009

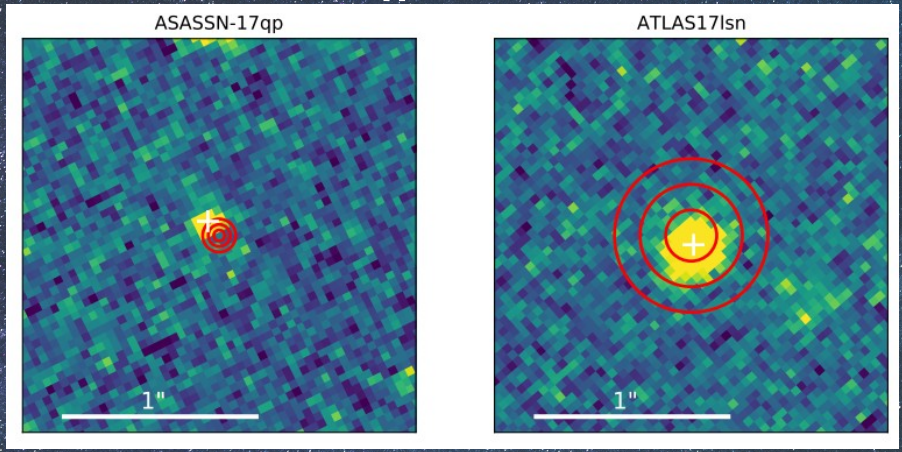


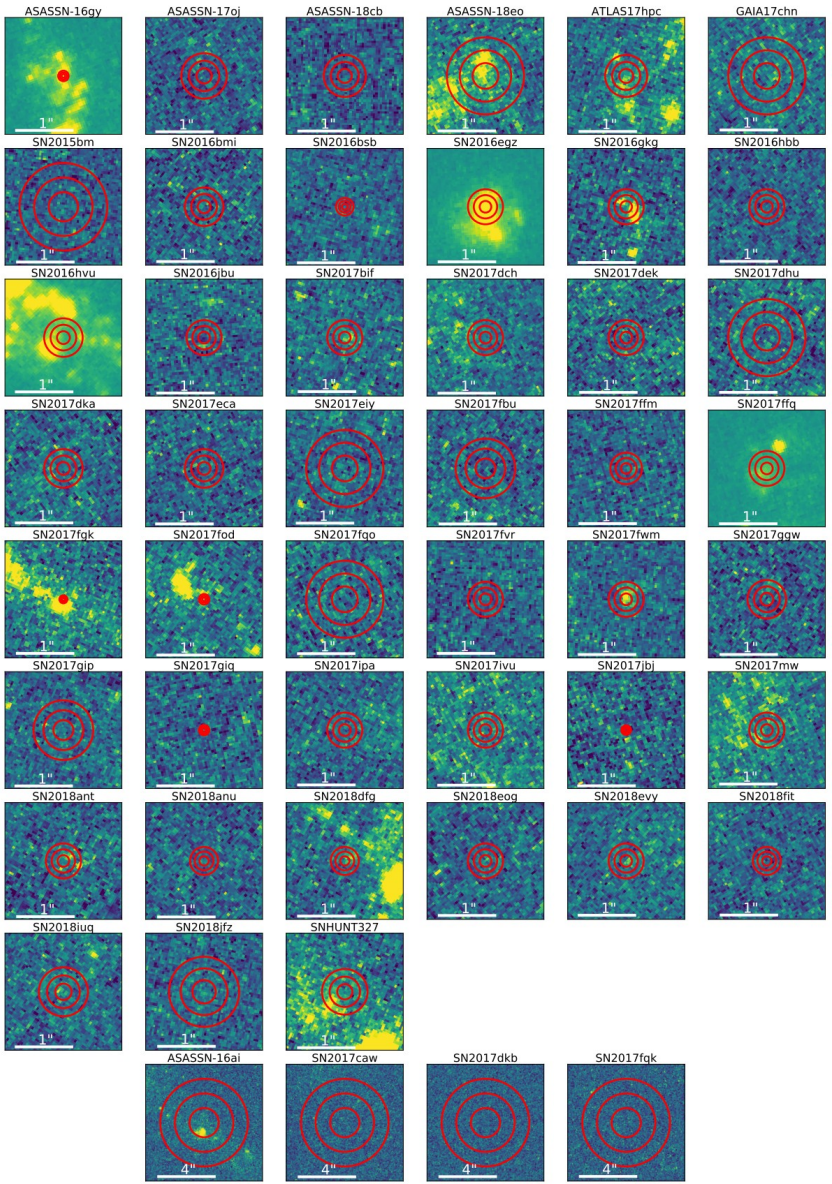
Bose+2013



AT2017ivv/ ASASSN-17qp

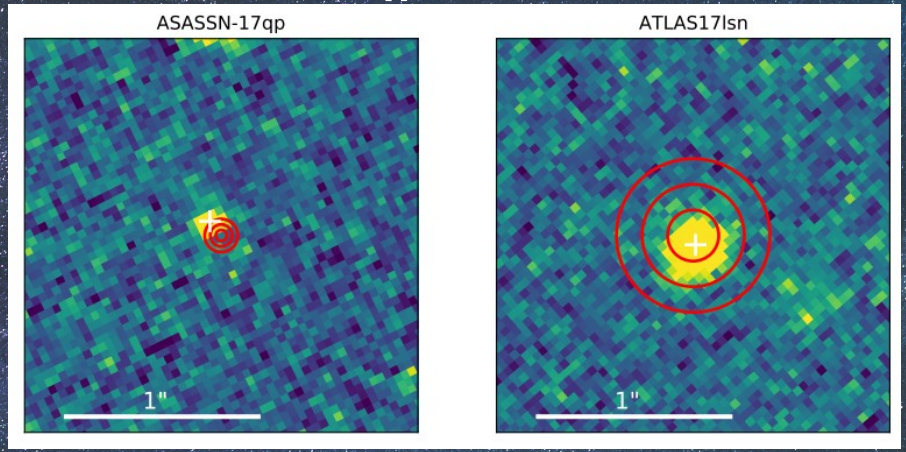
AT2017hcc/ ATLAS17lsn

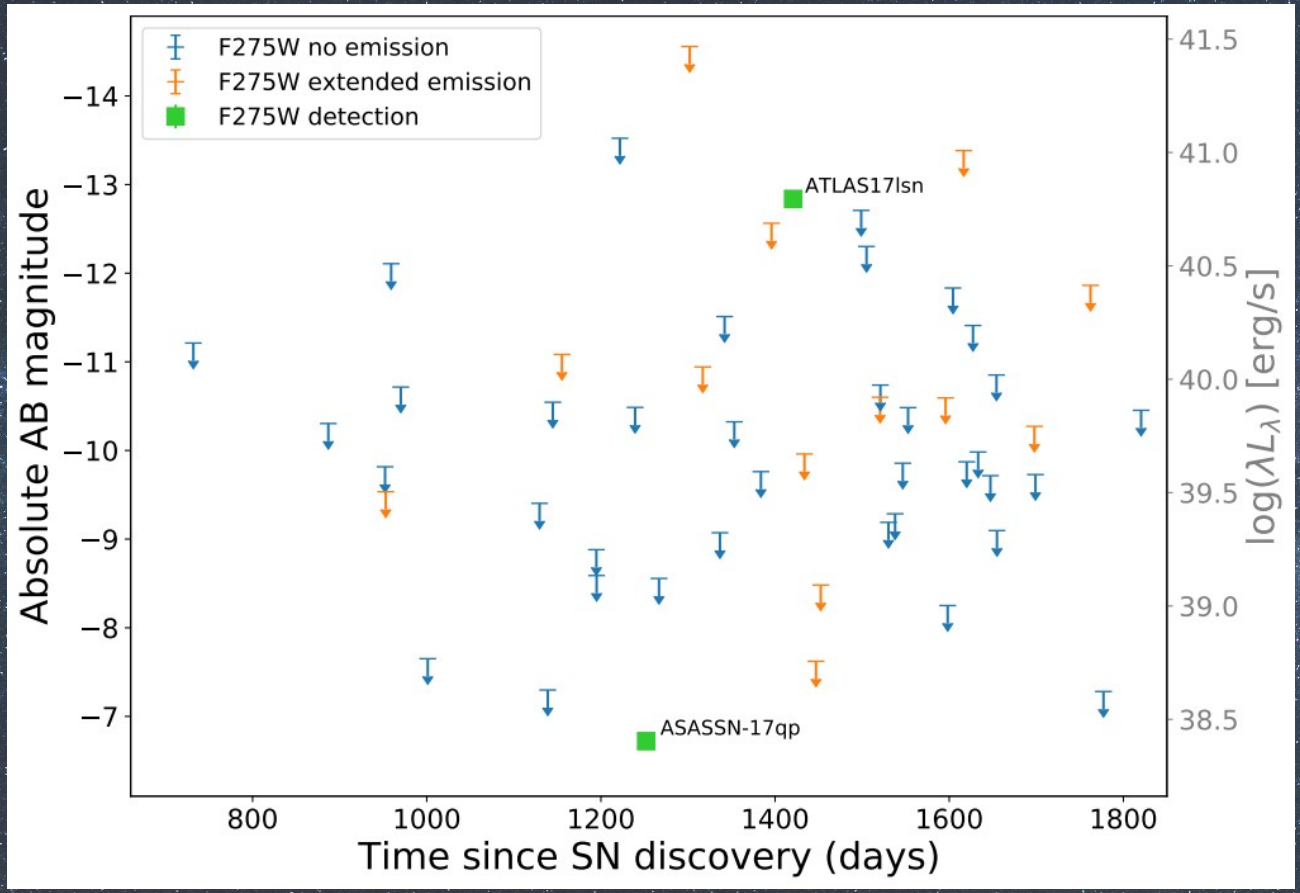


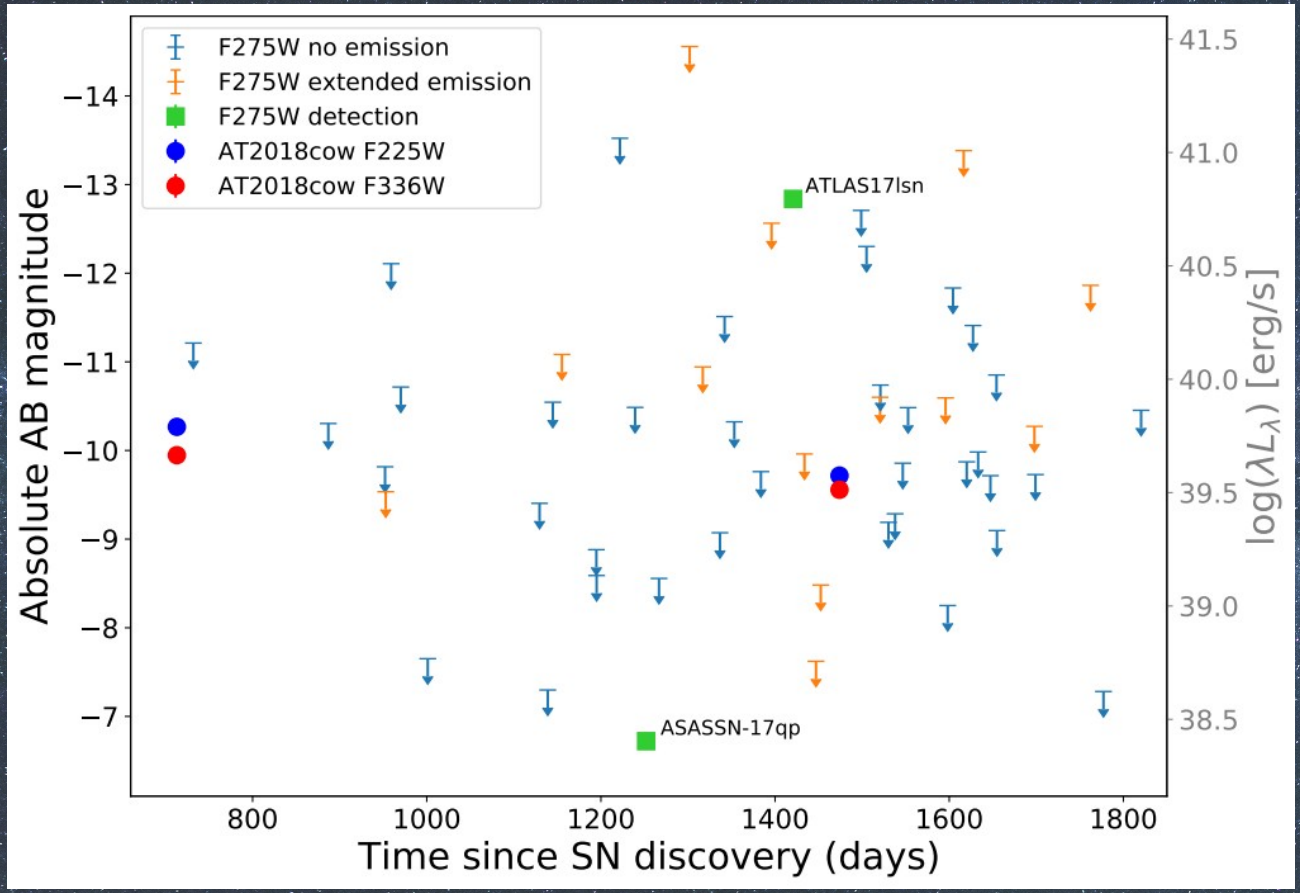

ASASSN-16gy
ASASSN-17oj
ASASSN-18cb
ASASSN-18eo
ATLAS17hpc
GAIA17chn
SN2015bm
SN2016bml
SN2016bsb
SN2016egz
SN2016gkg
SN2016hbb
SN2016hvu
SN2016jbu
SN2017bif
SN2017dch
SN2017dek
SN2017dhu
SN2017dka
SN2017eca
SN2017eiy
SN2017fbu
SN2017ffm
SN2017ffq
SN2017fgk
SN2017fod
SN2017fqo
SN2017fvr
SN2017fwm
SN2017ggw
SN2017gip
SN2017giq
SN2017ipa
SN2017ivu
SN2017jbj
SN2017mw
SN2018ant
SN2018anu
SN2018dfg
SN2018eog
SN2018evy
SN2018fit
SN2018iug
SN2018jfz
SNHUNT327
ASASSN-16ai
SN2017caw
SN2017dkb
SN2017fqk
1"
4"

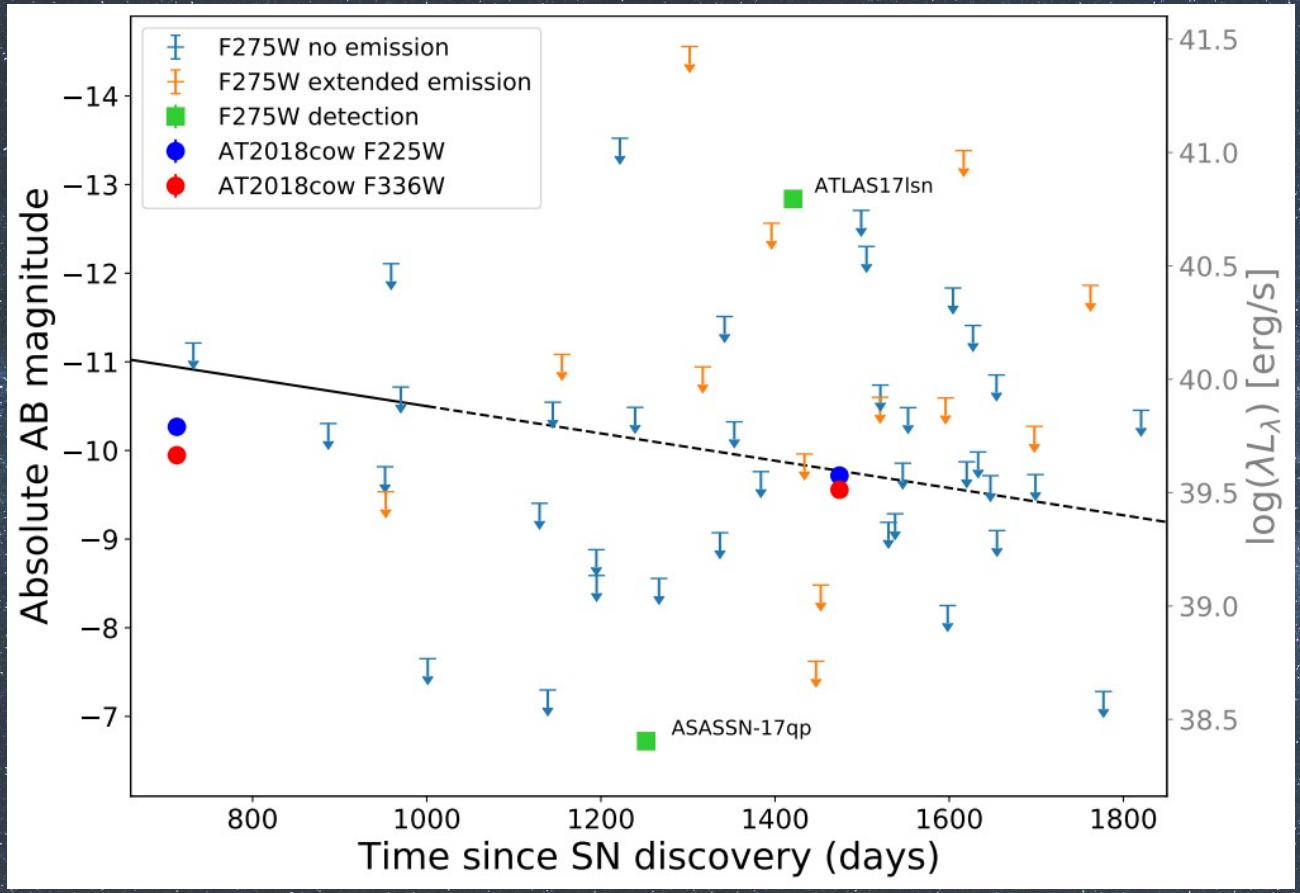
AT2017ivv/
ASASSN-17qp

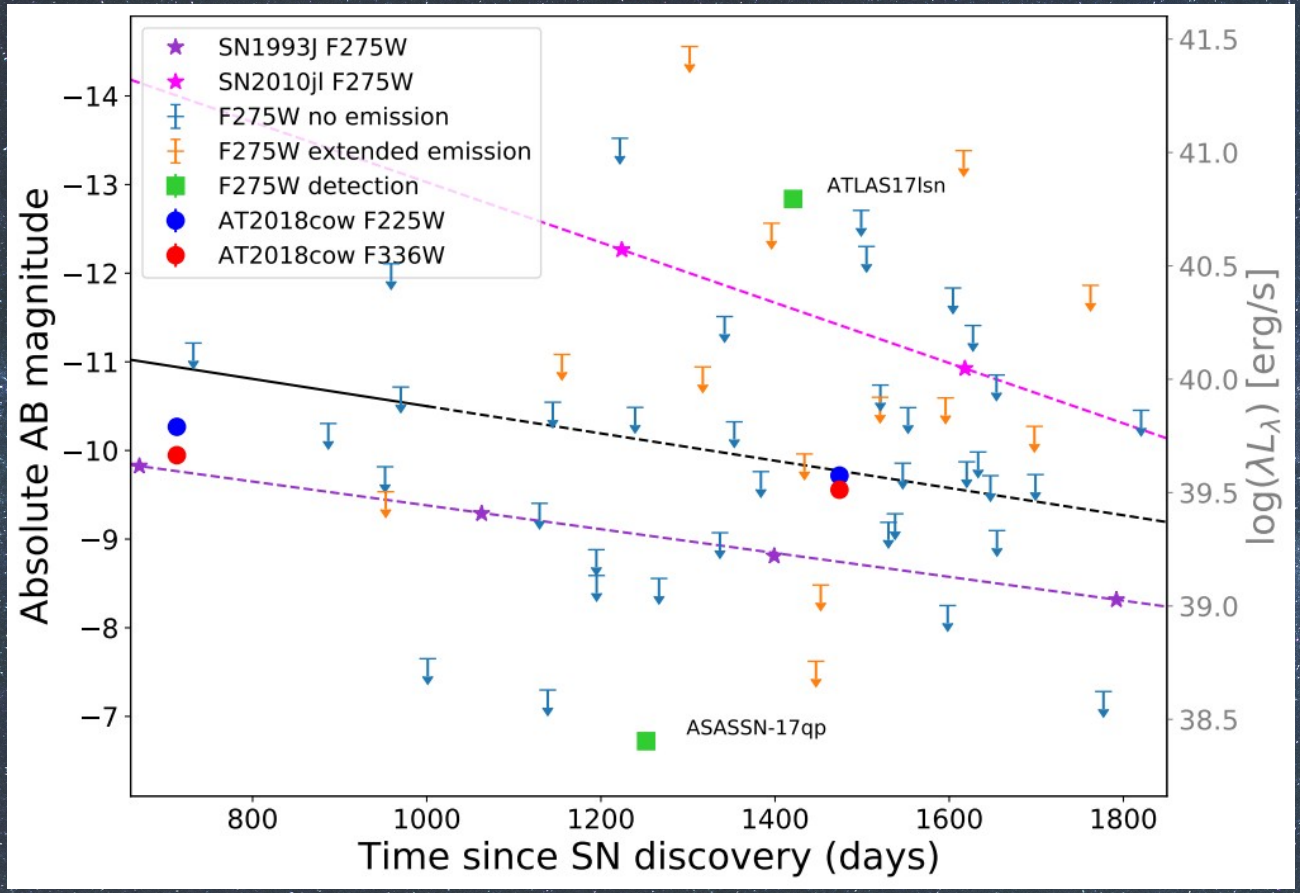
AT2017hcc/
ATLAS17lsn

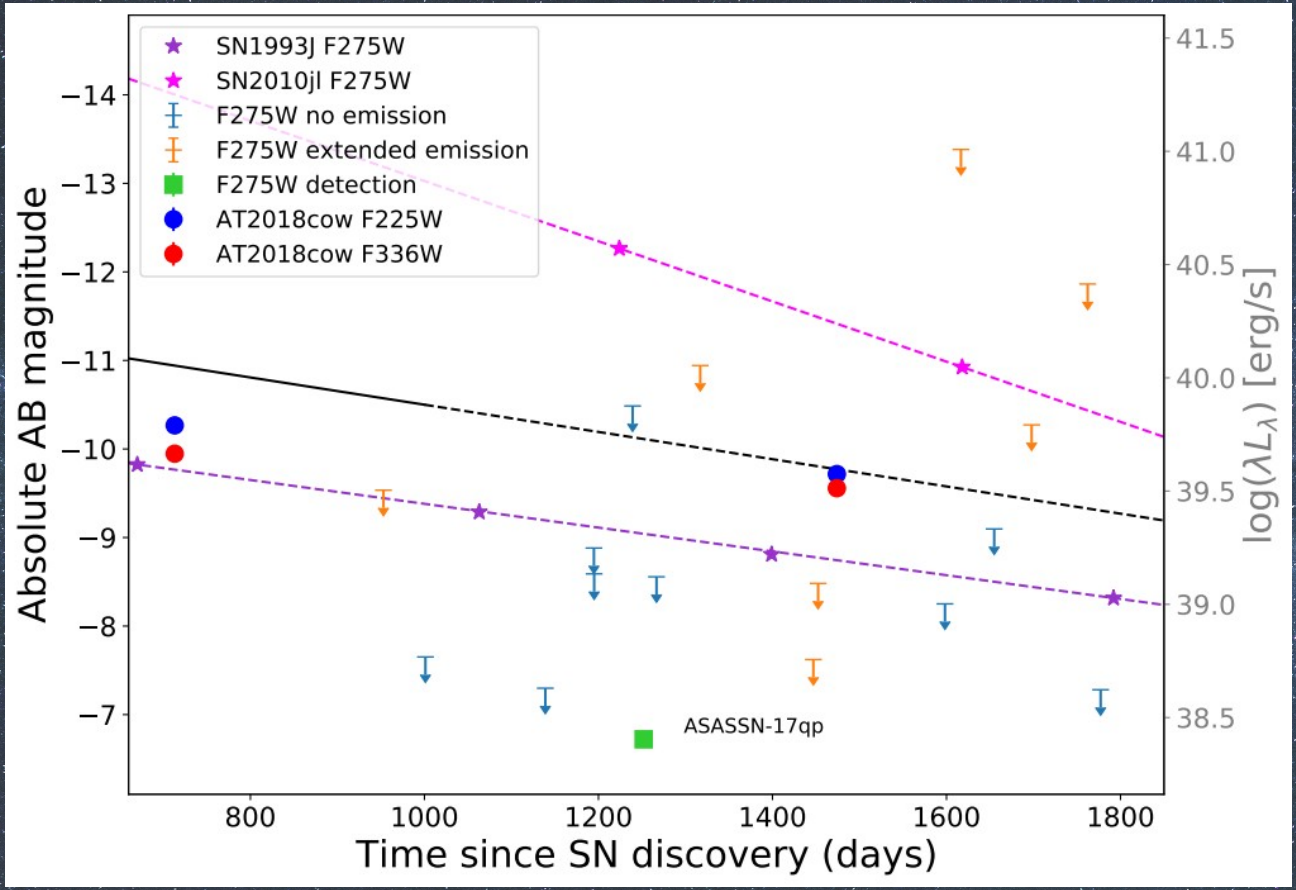


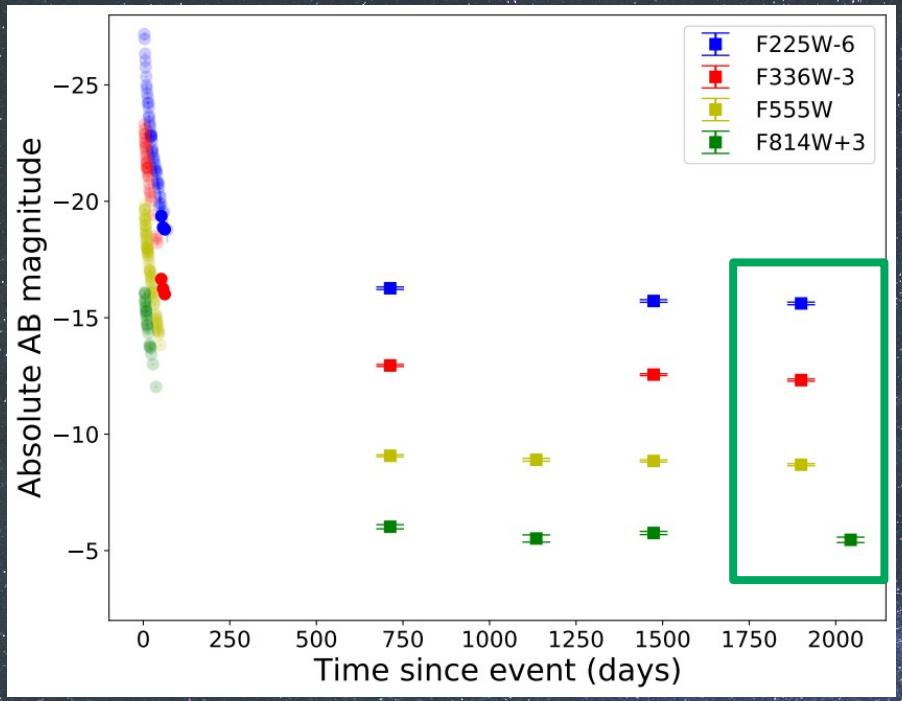

F275W no emission
F275W extended emission
F275W detection
ATLAS17lsn
ASASSN-17qp
Absolute AB magnitude
log(λL_λ) [erg/s]
Time since SN discovery (days)
−14
−13
−12
−11
−10
−9
−8
−7
41.5
41.0
40.5
40.0
39.5
39.0
38.5
800
1000
1200
1400
1600
1800

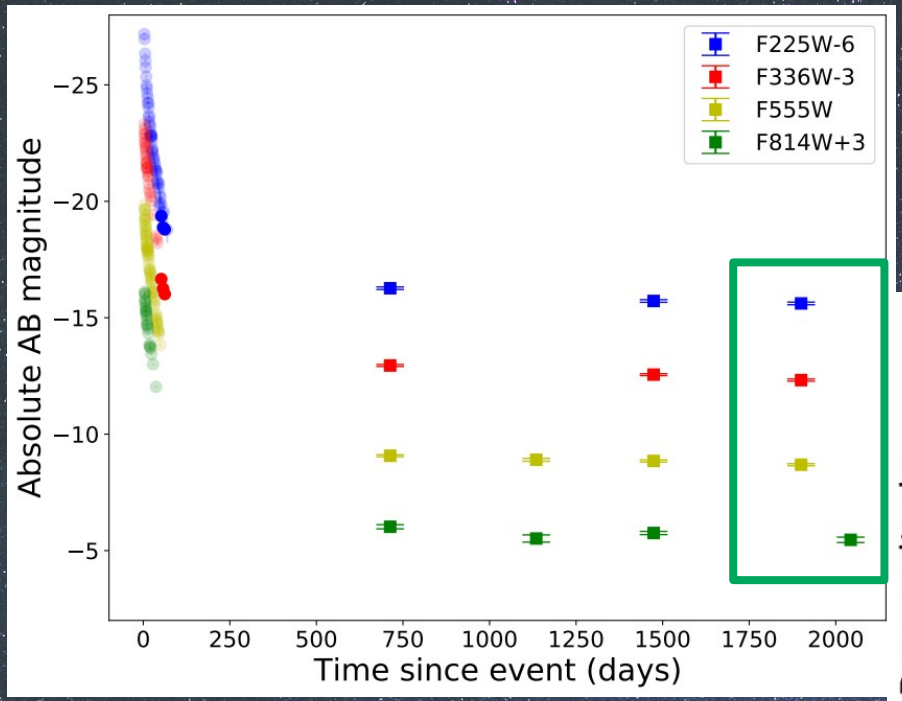

F275W no emission
F275W extended emission
F275W detection
AT2018cow F225W
AT2018cow F336W
ATLAS17lsn
ASASSN-17qp
Absolute AB magnitude
log(λL_λ) [erg/s]
Time since SN discovery (days)
−14
−13
−12
−11
−10
−9
−8
−7
41.5
41.0
40.5
40.0
39.5
39.0
38.5
800
1000
1200
1400
1600
1800

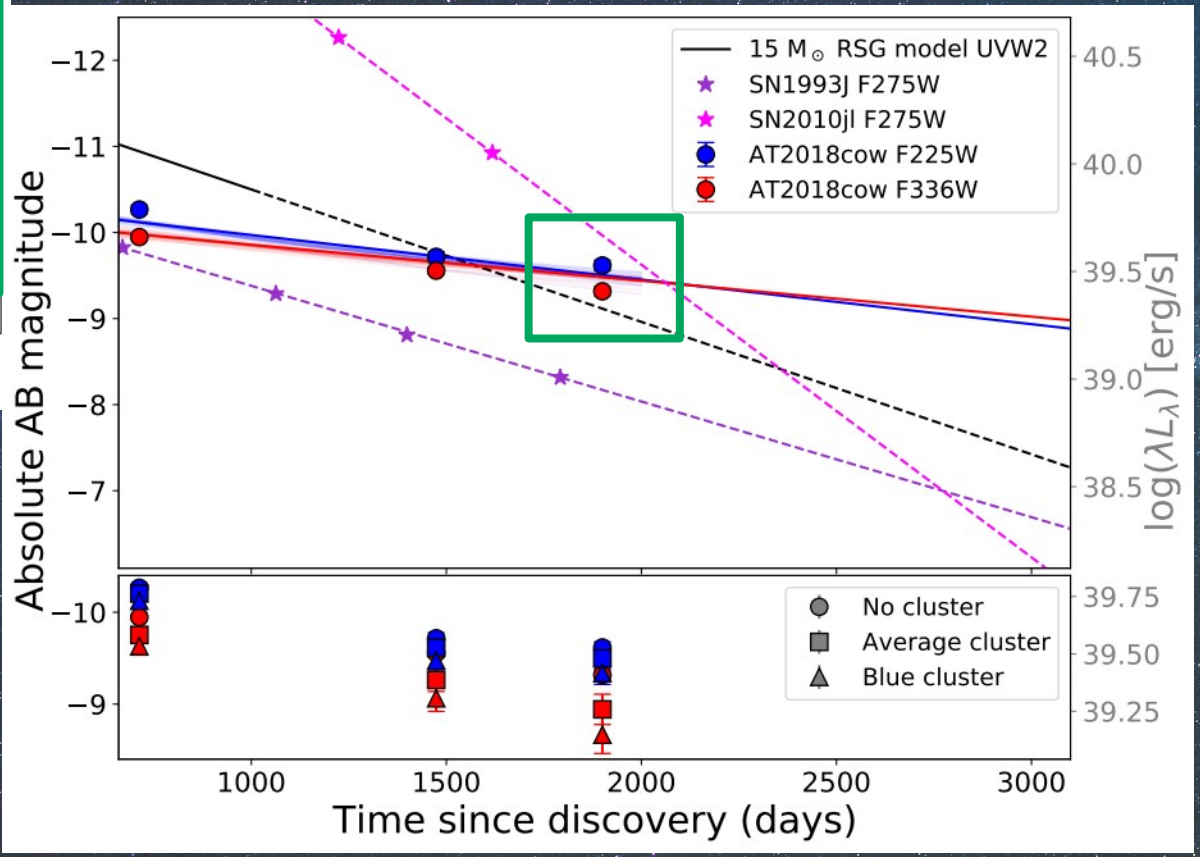

F275W no emission
F275W extended emission
F275W detection
AT2018cow F225W
AT2018cow F336W
ATLAS17lsn
ASASSN-17qp
Absolute AB magnitude
log(λL_λ) [erg/s]
Time since SN discovery (days)
−14
−13
−12
−11
−10
−9
−8
−7
41.5
41.0
40.5
40.0
39.5
39.0
38.5
800
1000
1200
1400
1600
1800


SN1993J F275W
SN2010jl F275W
F275W no emission
F275W extended emission
F275W detection
AT2018cow F225W
AT2018cow F336W
ATLAS17lsn
ASASSN-17qp
Absolute AB magnitude
log(λL_λ) [erg/s]
Time since SN discovery (days)
−14
−13
−12
−11
−10
−9
−8
−7
41.5
41.0
40.5
40.0
39.5
39.0
38.5
800
1000
1200
1400
1600
1800


SN1993J F275W
SN2010jl F275W
F275W no emission
F275W extended emission
F275W detection
AT2018cow F225W
AT2018cow F336W
ASASSN-17qp
Absolute AB magnitude
log(λL_λ) [erg/s]
Time since SN discovery (days)
−14
−13
−12
−11
−10
−9
−8
−7
41.5
41.0
40.5
40.0
39.5
39.0
38.5
800
1000
1200
1400
1600
1800


F225W-6
F336W-3
F555W
F814W+3
Absolute AB magnitude
−25
−20
−15
−10
−5
0
250
500
750
1000
1250
1500
1750
2000
Time since event (days)


F225W-6
F336W-3
F555W
F814W+3
Absolute AB magnitude
−25
−20
−15
−10
−5
0
250
500
750
1000
1250
1500
1750
2000
Time since event (days)


15 M⊙ RSG model UVW2
SN1993J F275W
SN2010jl F275W
AT2018cow F225W
AT2018cow F336W
Absolute AB magnitude
−12
−11
−10
−9
−8
−7
40.5
40.0
39.5
39.0
38.5
log(λL_λ) [erg/s]
No cluster
Average cluster
Blue cluster
−10
−9
39.75
39.50
39.25
1000
1500
2000
2500
3000
Time since discovery (days)

Take Home Messages

Late time UV emission is rare, but useful

AT2018cow unlikely to be an interacting CCSN

arXiv:2411.09690