KEGS (Kepler Extra-Galactic Survey)

www.mso.anu.edu.au/kegs/

Brad E. Tucker

The KEGS Core Team – The KEGGERS

Rob Olling

Ed Shaya

Richard Mushostsky

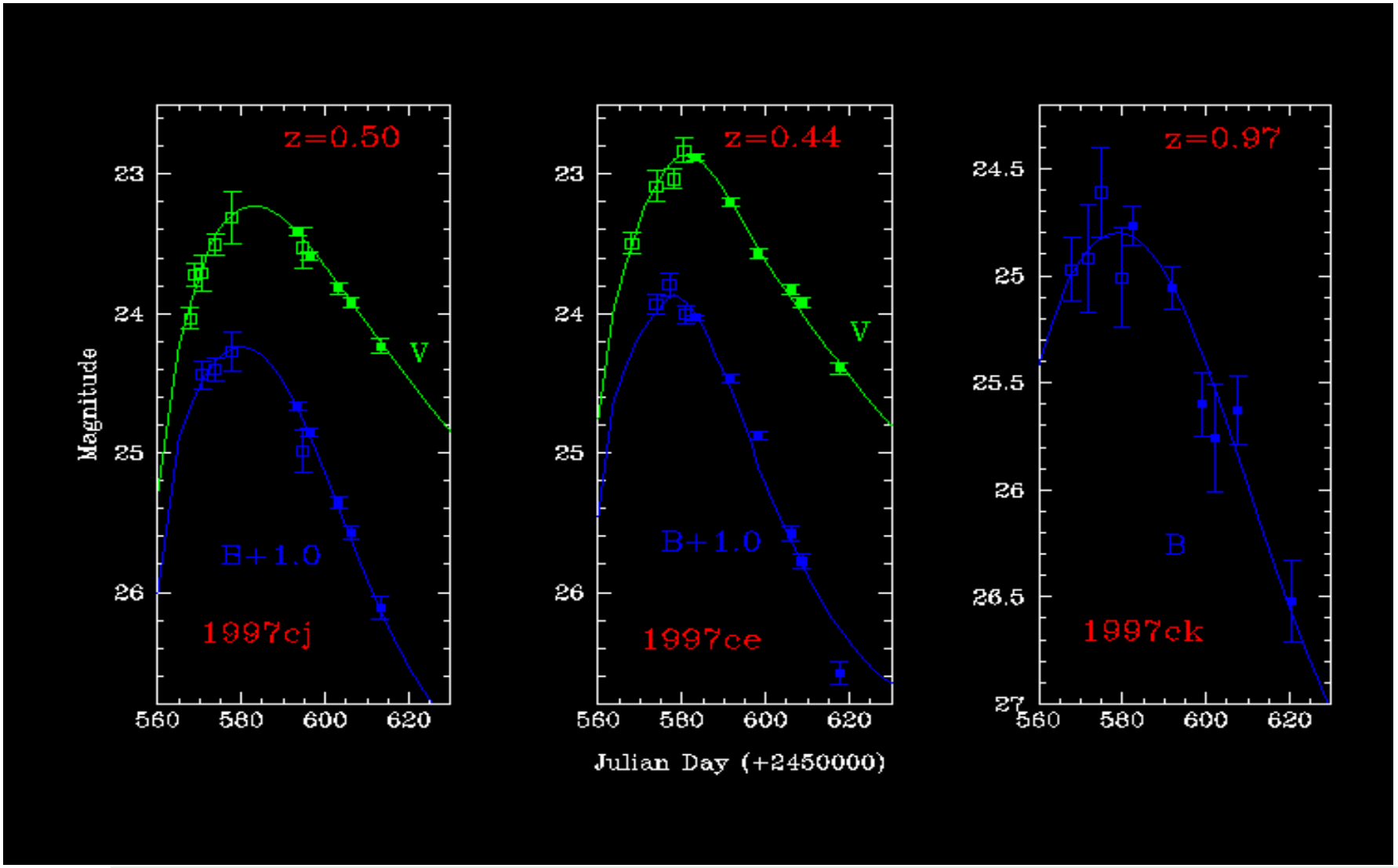
Armin Rest

Peter Garnavich

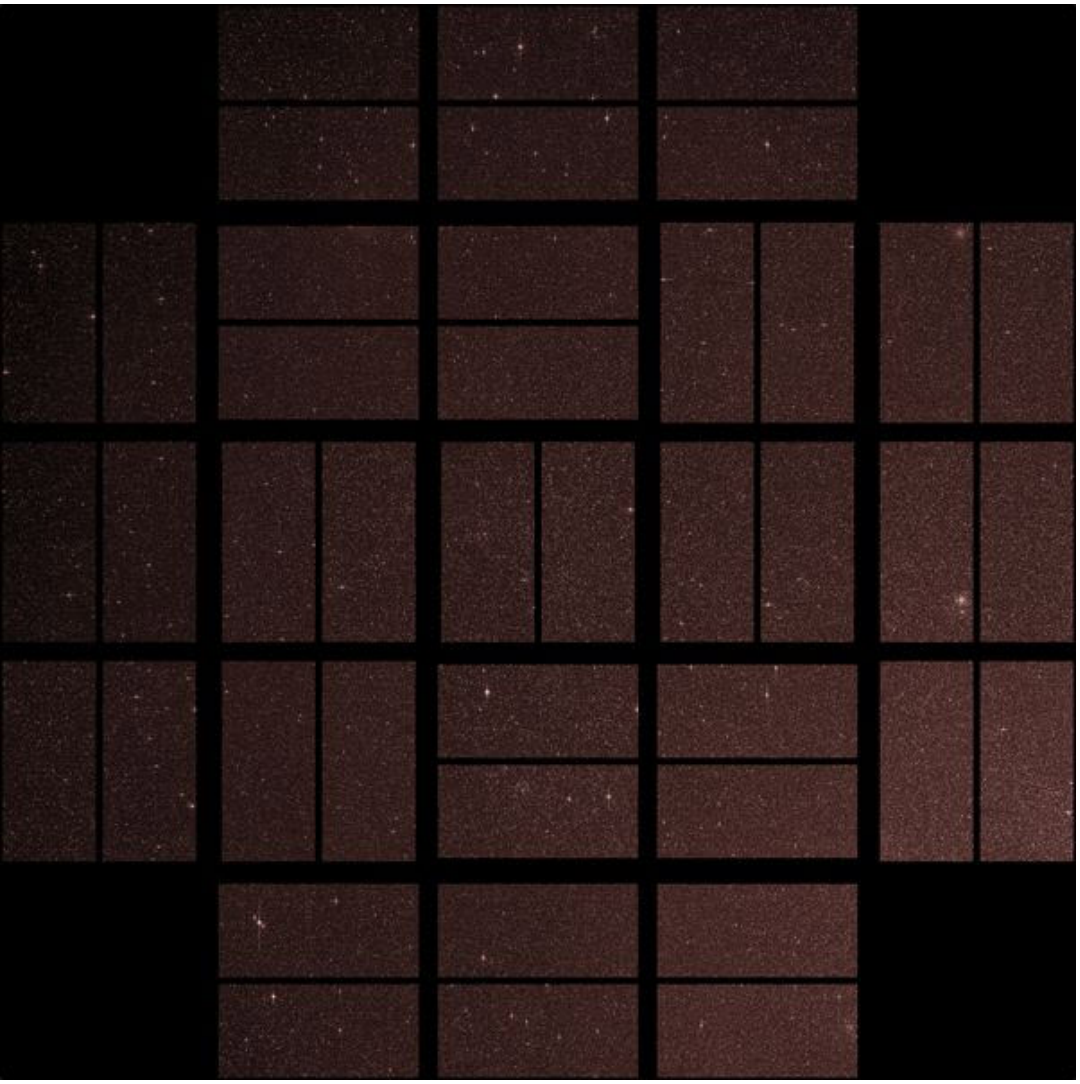
Dan Kasen

Brad Tucker

Cosmology SN Light Curves



Kepler



Transiting planets around bright stars

105 sq. degree field in Cygnus

~100K targets (~3k GO)

1 min + 30 min cadences

Only selected pixels downloaded

Monitored 500 galaxies

SN with Kepler

6 SN from 2010 - 2012

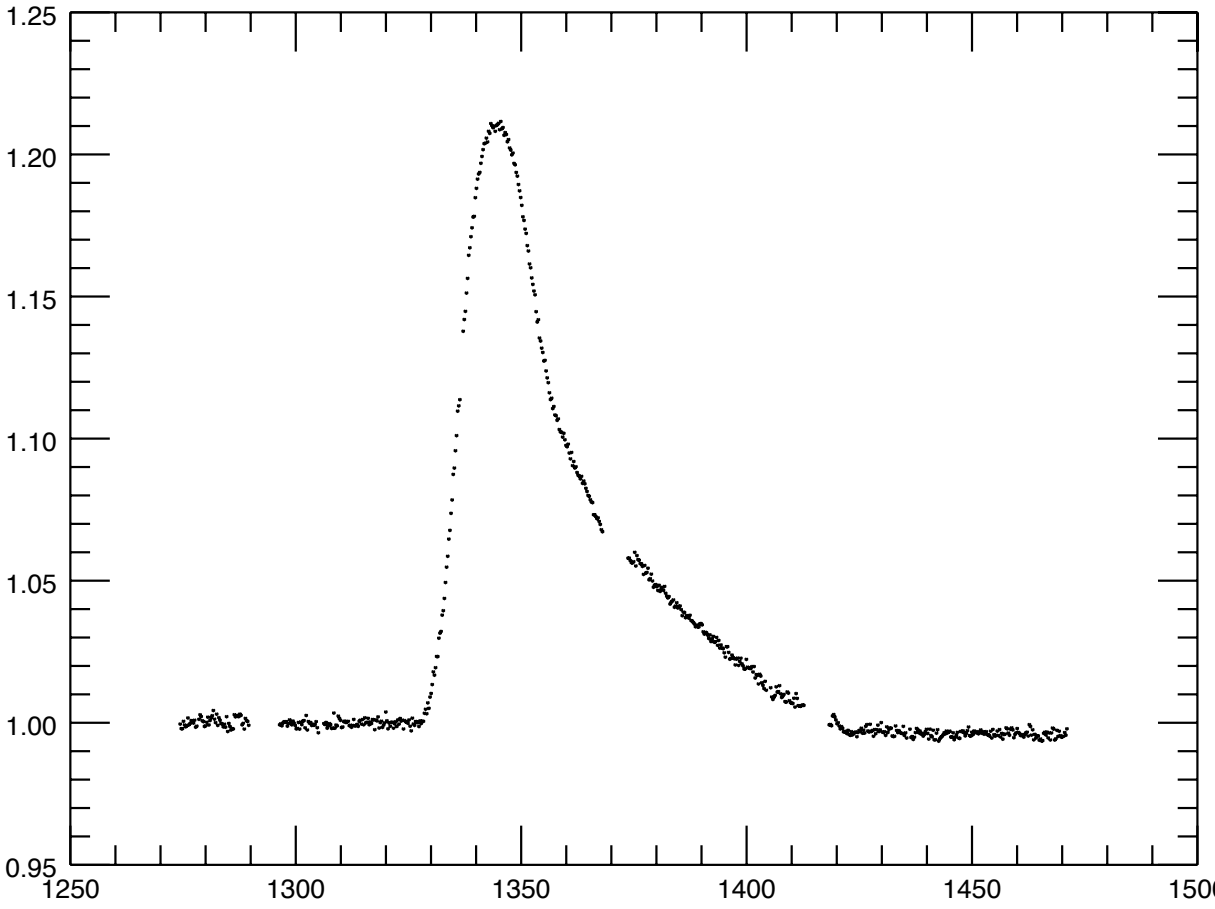
3 Ia's (Olling+, 2015, Nature)

2 II-P (Tucker+, in prep)

1 IIn/Ia-csm (Garnavich+, in prep)

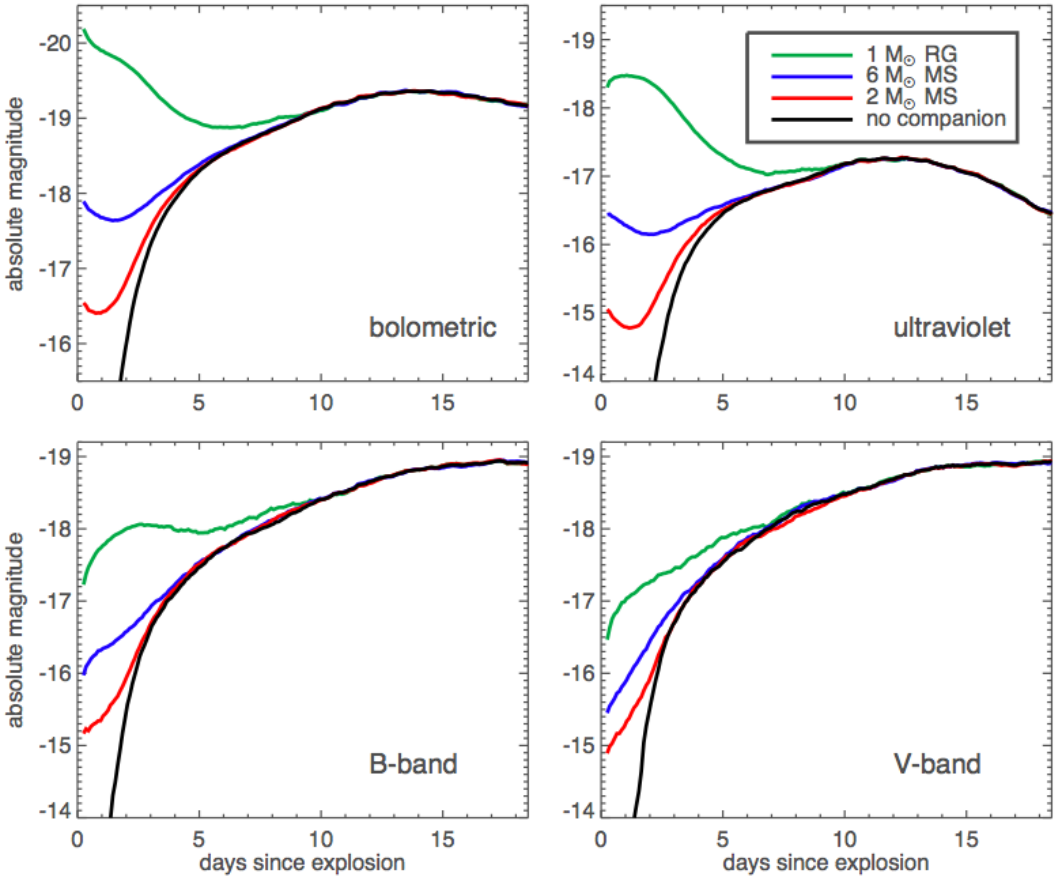
Z=0.05 – 0.144

4000 data points per SN



Olling+ 2015, Nature

Signs of the Donor Star



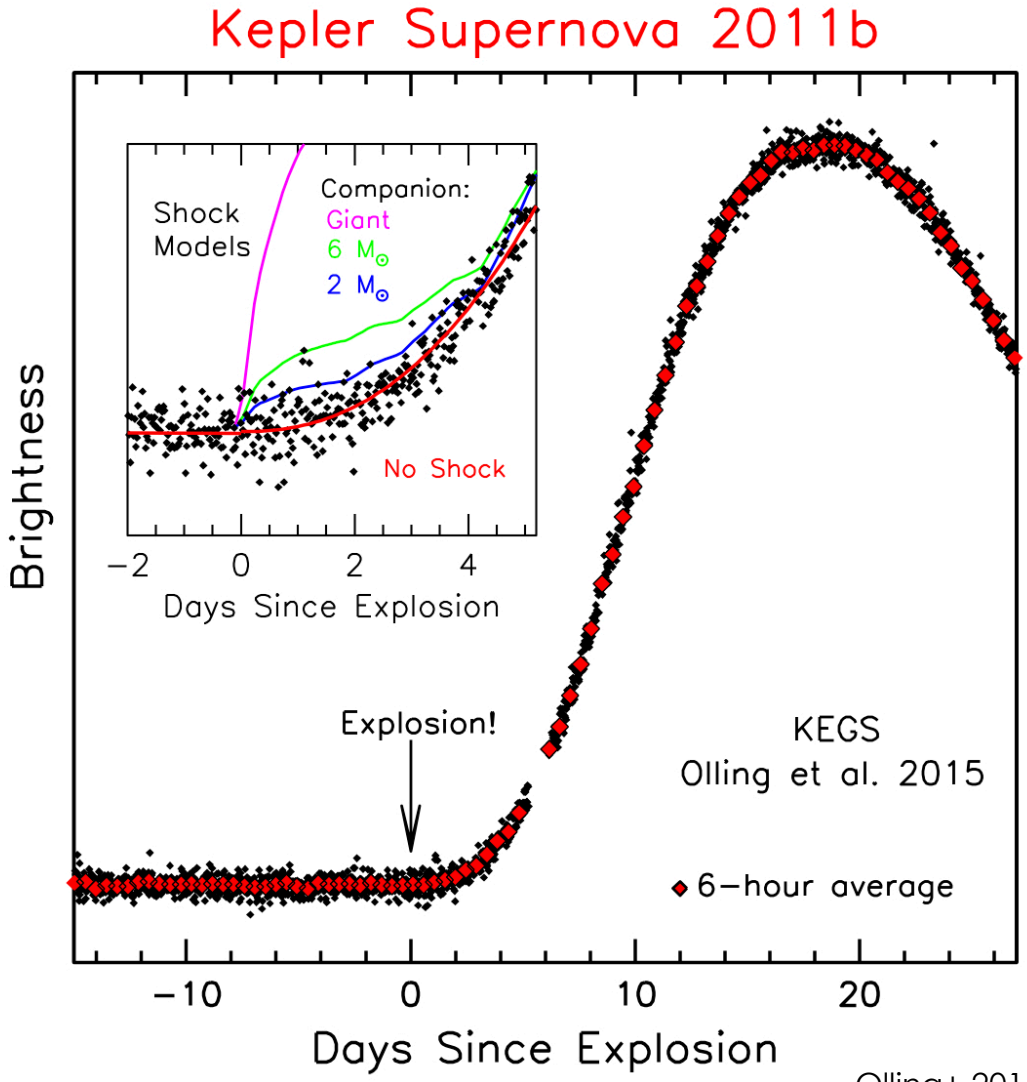
Kasen (2010)

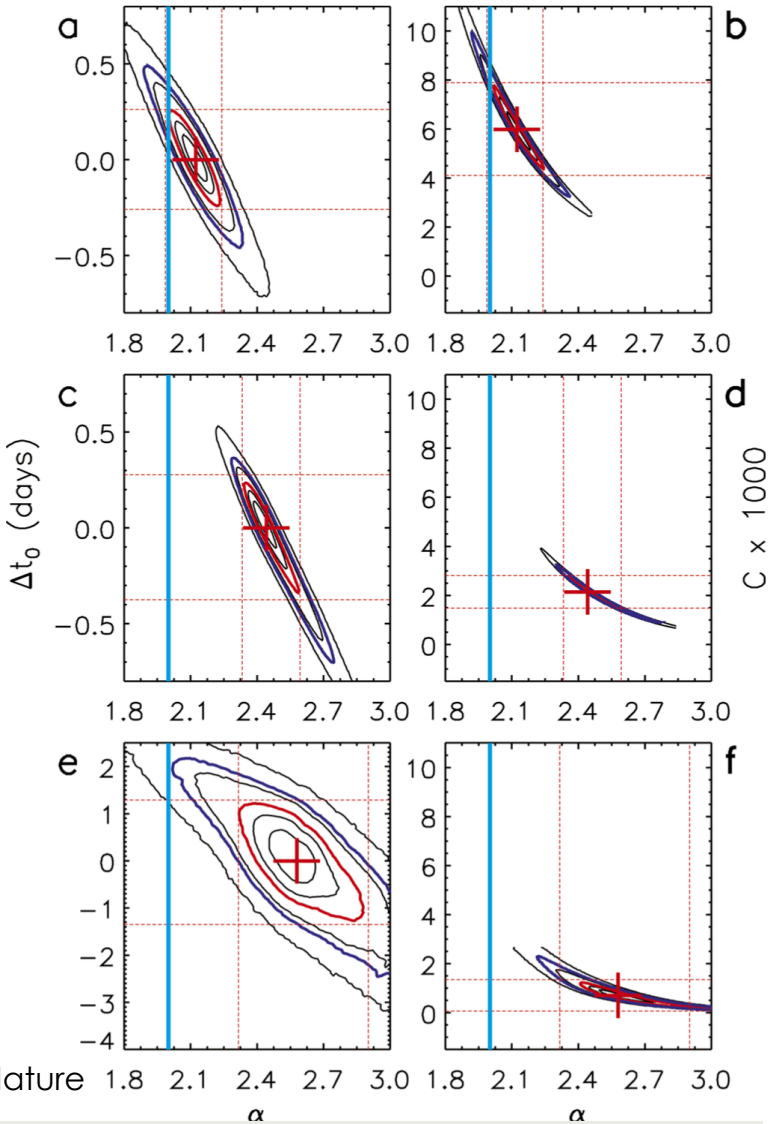
The donor star interferes with the ejecta from the explosion

t < ~5 days in B band for a Red Giant shows a significant bump

Optical bands only suffer a slight modification to their light curve rise time, at very early times

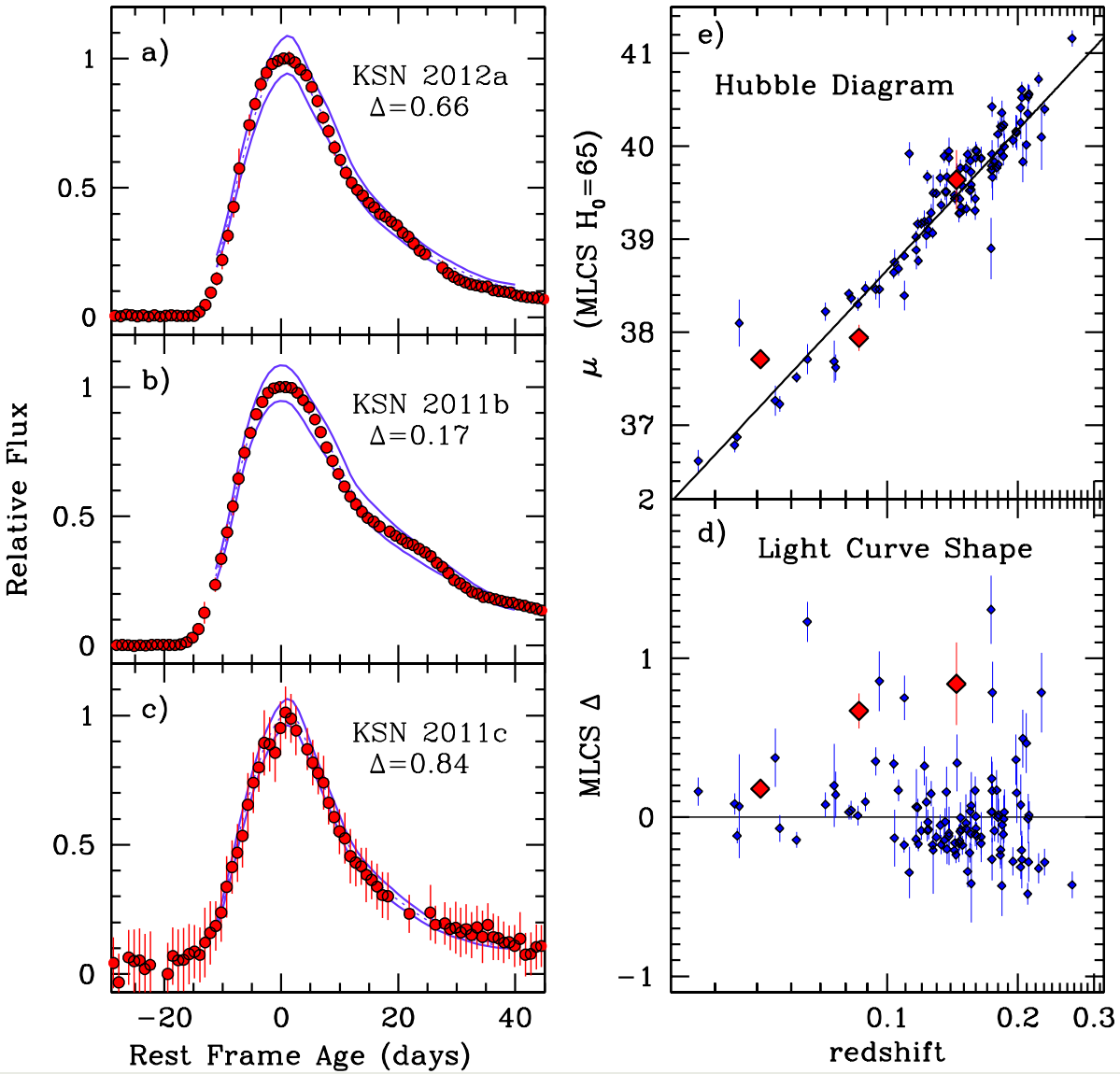
Type Ia SN with Kepler





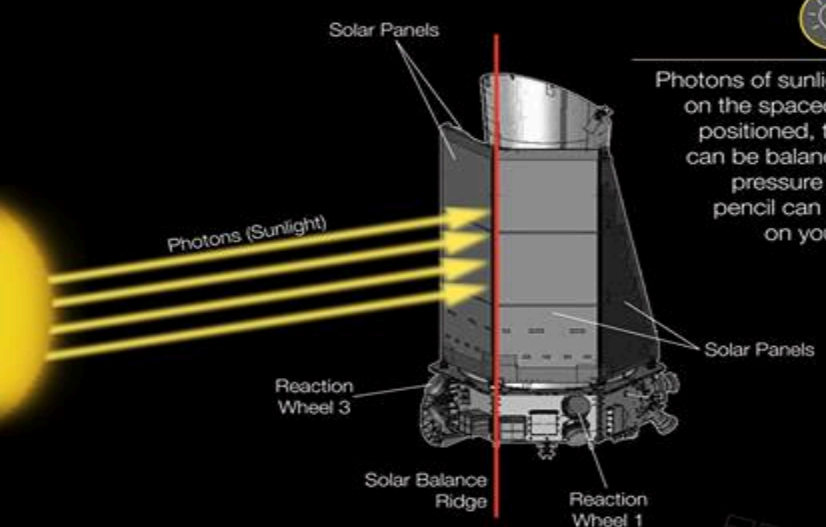
Olling+ 2015, Nature

Kepler Cosmology

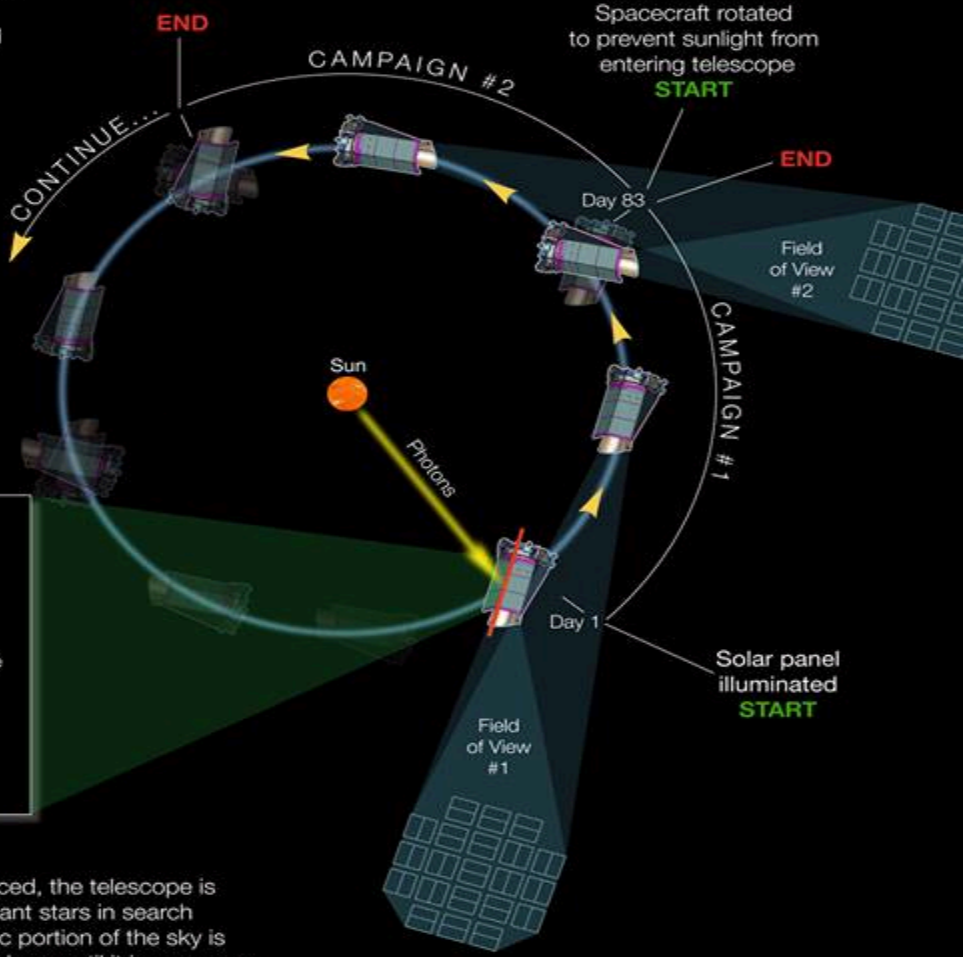


Olling+ 2015, Nature

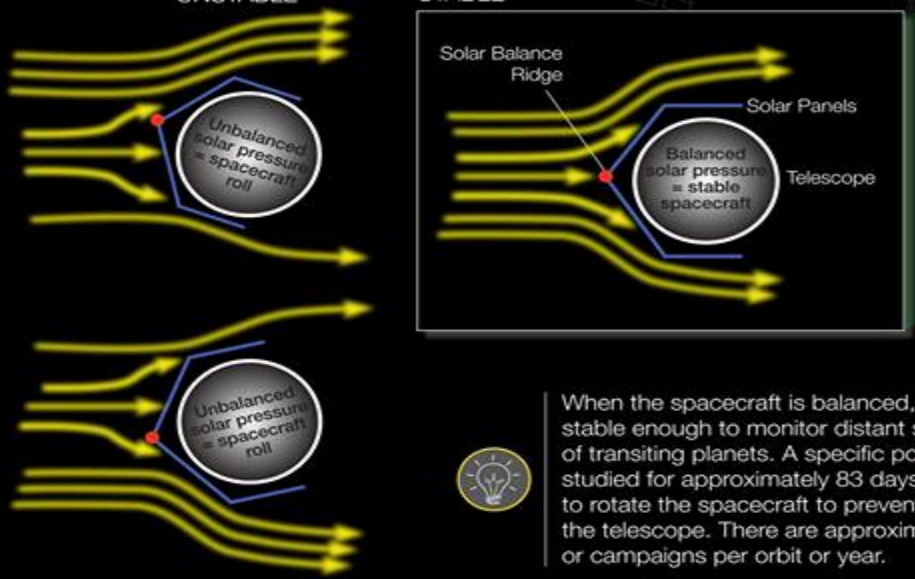
Kepler's Second Light: How K2 Will Work



Photons of sunlight exert pressure on the spacecraft. If properly positioned, the spacecraft can be balanced against the pressure much as a pencil can be balanced on your finger.



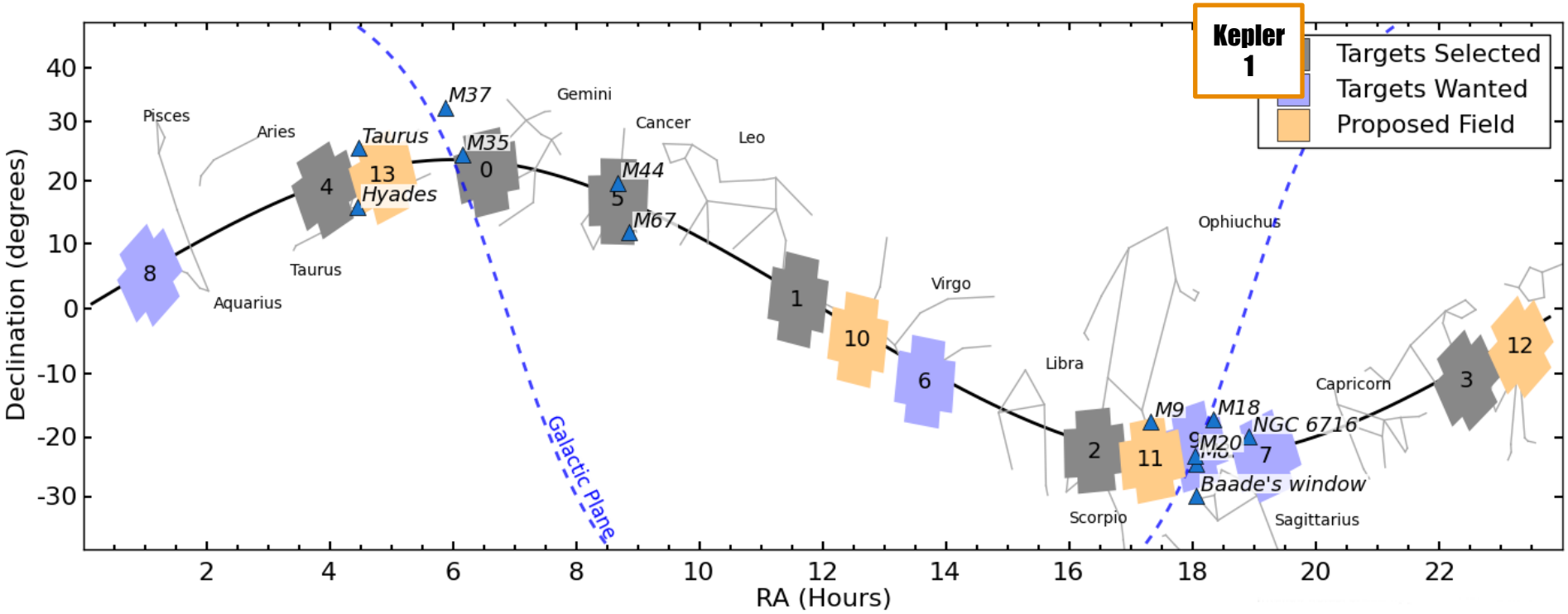
TOP-DOWN VIEWS OF SPACECRAFT



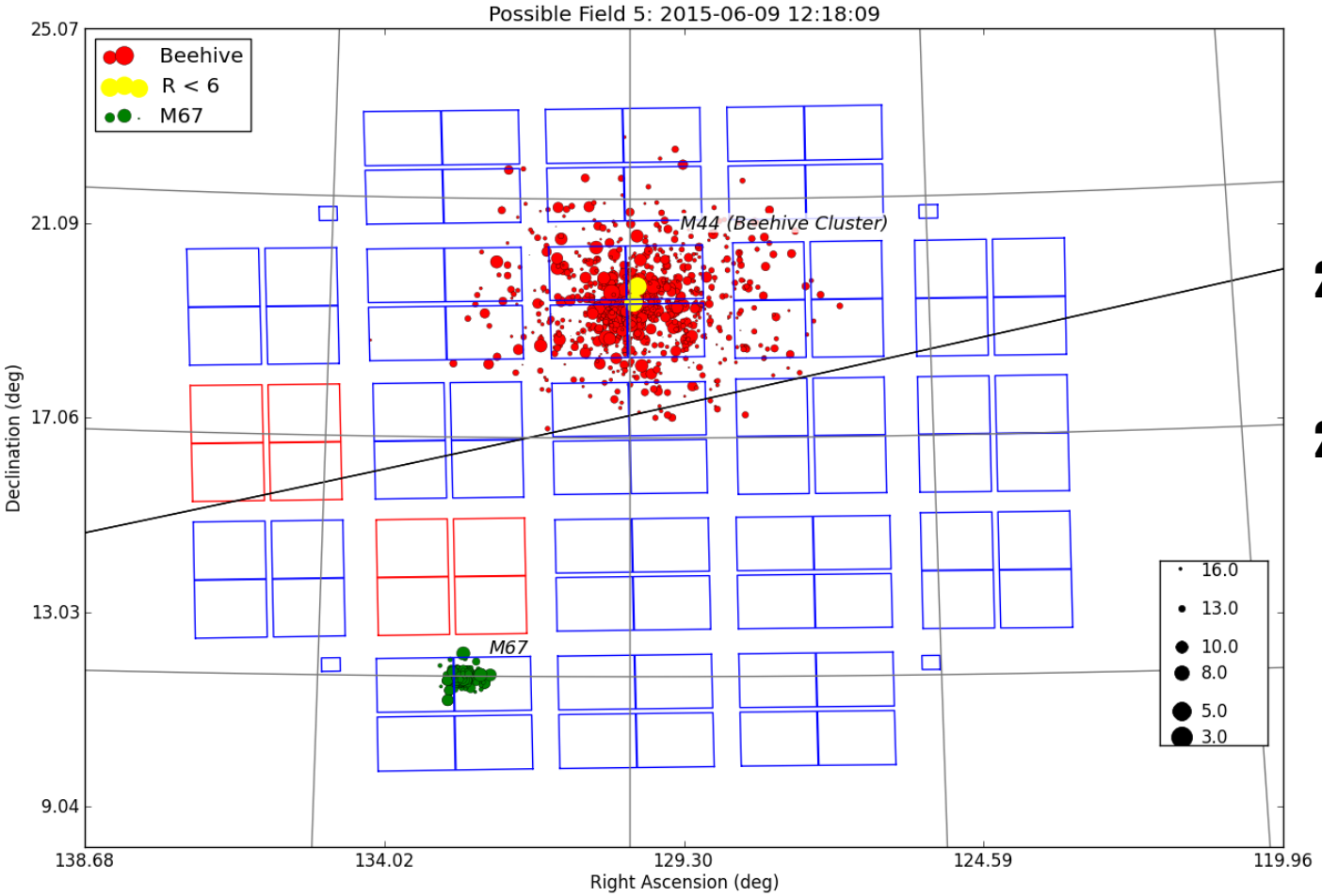
When the spacecraft is balanced, the telescope is stable enough to monitor distant stars in search of transiting planets. A specific portion of the sky is studied for approximately 83 days, until it is necessary to rotate the spacecraft to prevent sunlight from entering the telescope. There are approximately 4.5 viewing periods or campaigns per orbit or year.

CONCEPTUAL ILLUSTRATION OF SPACECRAFT SOLAR DISTURBANCE. THE ACTUAL DISTURBANCE

K2 Fields


Kepler
1
Targets Selected
Targets Wanted
Proposed Field
Declination (degrees)
RA (Hours)
Pisces
Aries
Taurus
Aquarius
Gemini
Cancer
Leo
Virgo
Libra
Scorpio
Ophiuchus
Sagittarius
Capricorn
M37
M35
M44
M67
Hyades
M9
M18
NGC 6716
M20
Baade's window
Galactic Plane
8
4
13
0
5
1
10
6
2
11
9
7
3
12

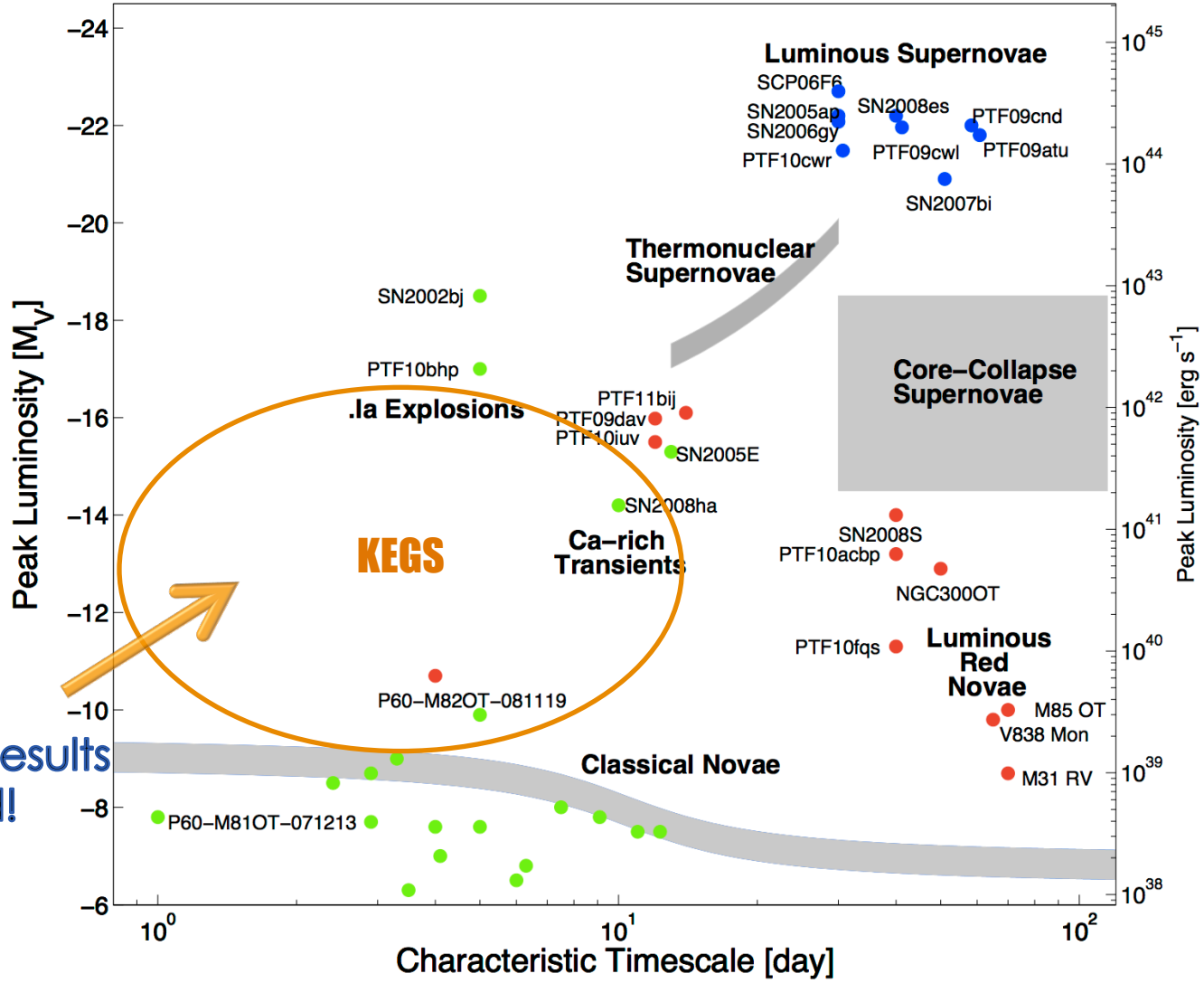
Campaign 5



2800 Galaxies

26 April – 11 July 2015

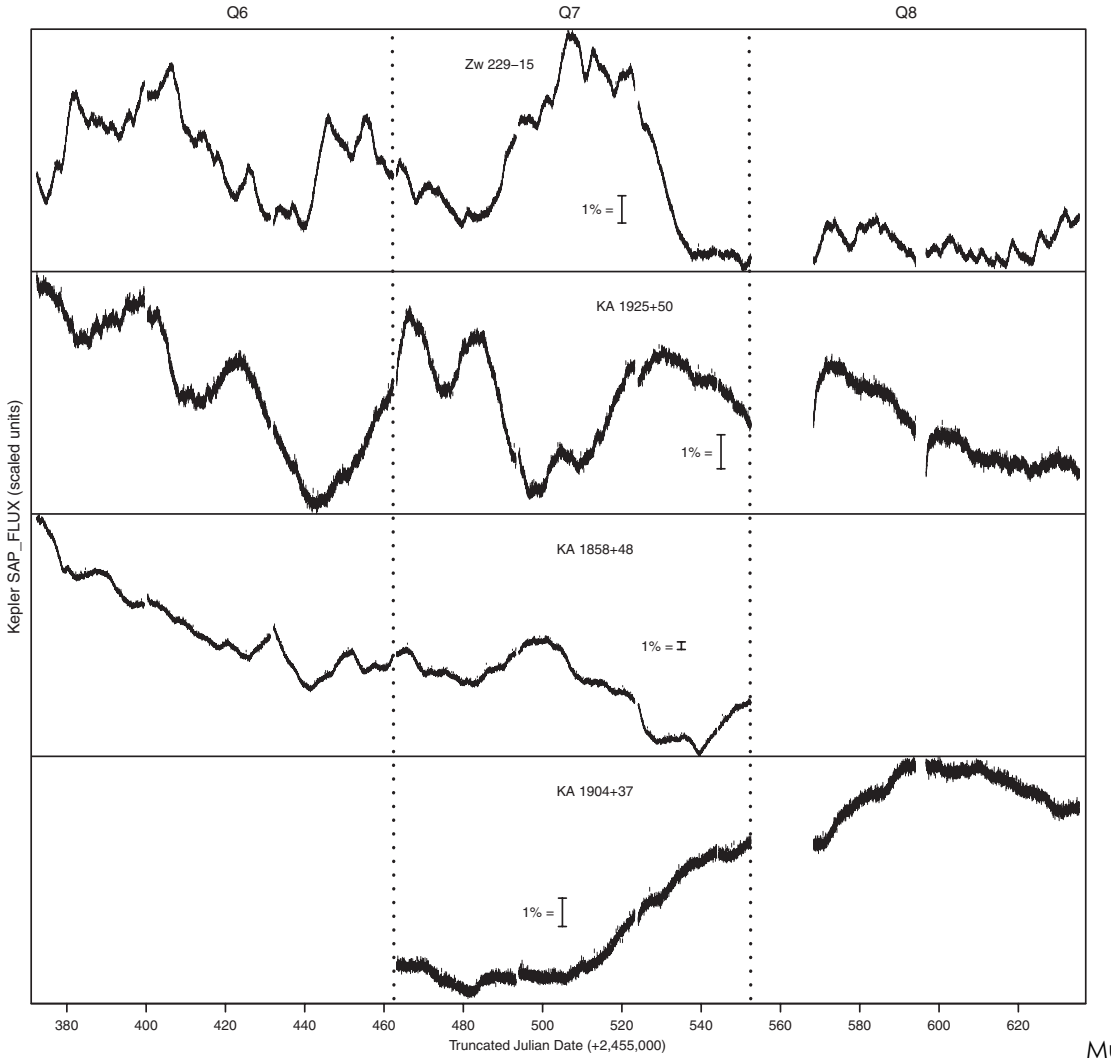
Fast and Faint



K2 Field1 Results
Stay tuned!

Image Credit :
Mansi Kasliwal

Active Galactic Nuclei



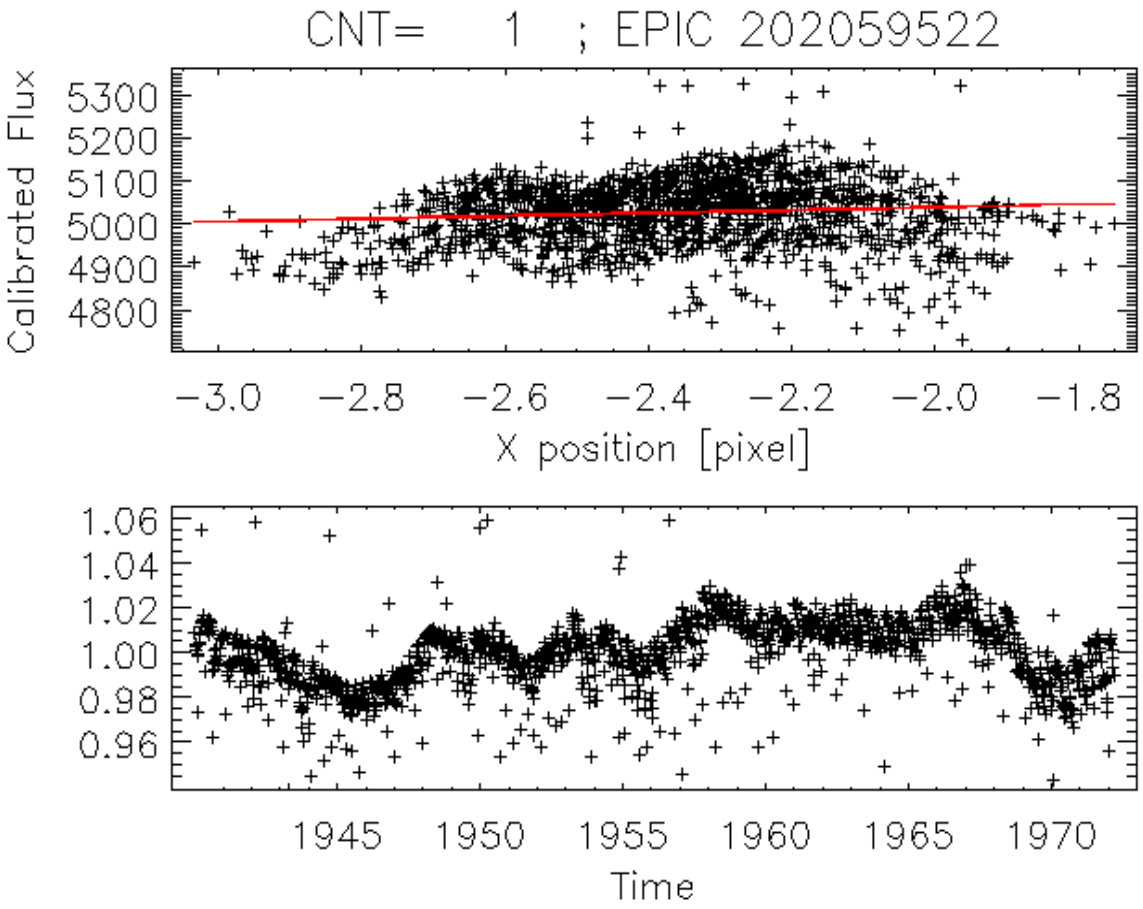
Mushotzky+11

~3% of galaxies low level AGN

Sensitivity ~0.01%

Aiming to find 300 – 500 new AGN

Quasars



Known QSO z-0.203

BL Lac

Variability ~ 1%

KEGS Plan + Goals

2 – 3 Fields per year (Galactic Cap Fields), 3-5K galaxies per field

3 – 10 SN per field, SN Shock break-out + subtle features

Fast, faint transients

AGN, QSO's

Improving cosmological samples

Need Ground Based Follow-up to type objects

Talk to me, Armin or Dan if you're thirsty for data and want some KEGS