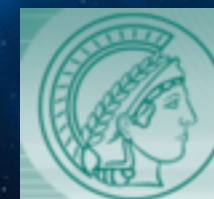


GROND followup of kilonovae

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MAX-PLANCK-INSTITUT
FÜR EXTRATERRESTRISCHE PHYSIK

Spectral coverage of instruments at ESO used to observe NGC 4993

First night campaign

2017 Aug 18

23:09:52

FORS2 POLARIMETRY

23:15:08

GROND IMAGE



23:19:11

EFOSC SPECTRUM

23:22:16

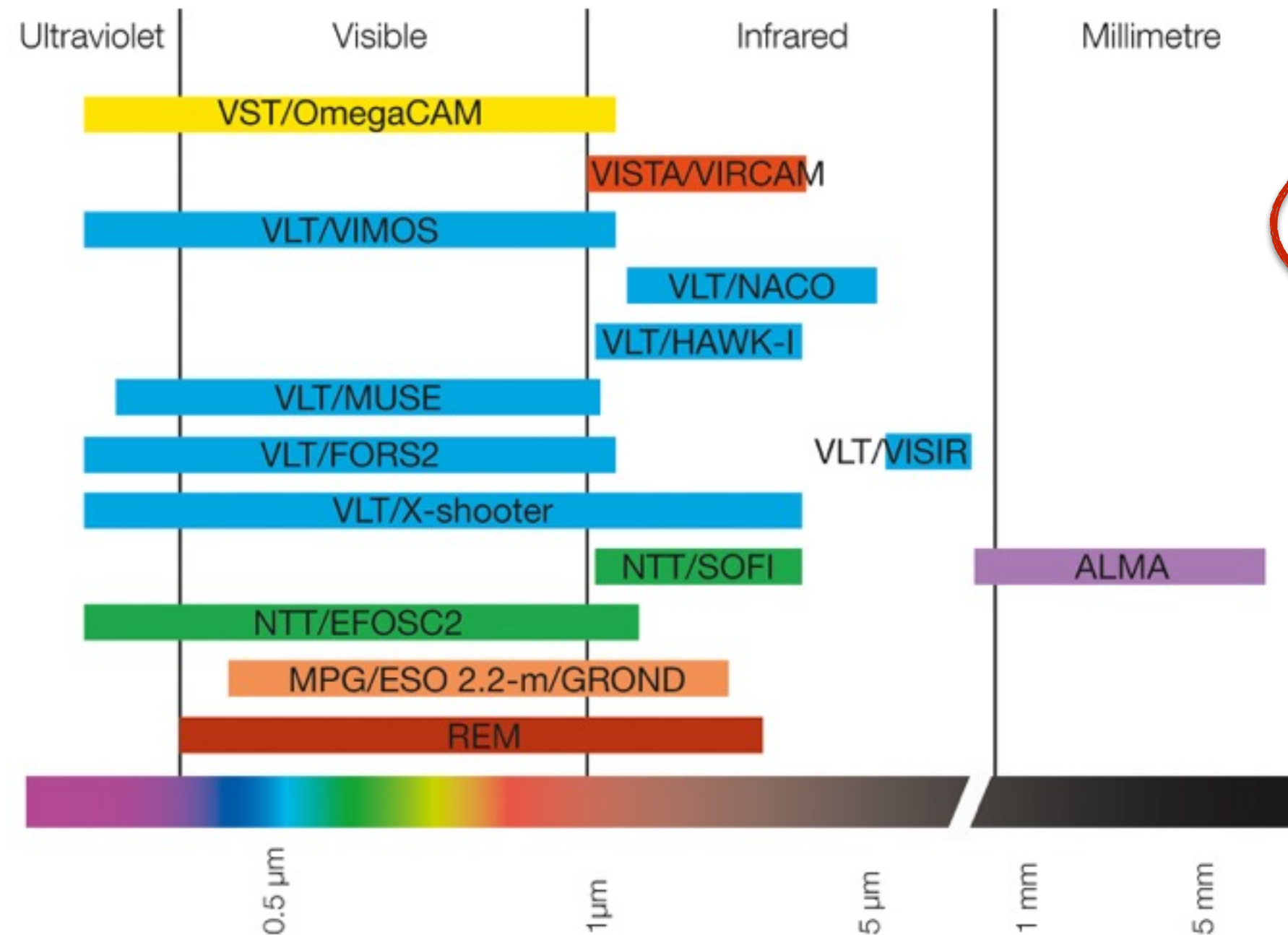
XSHOOTER SPECTRUM

23:37:29

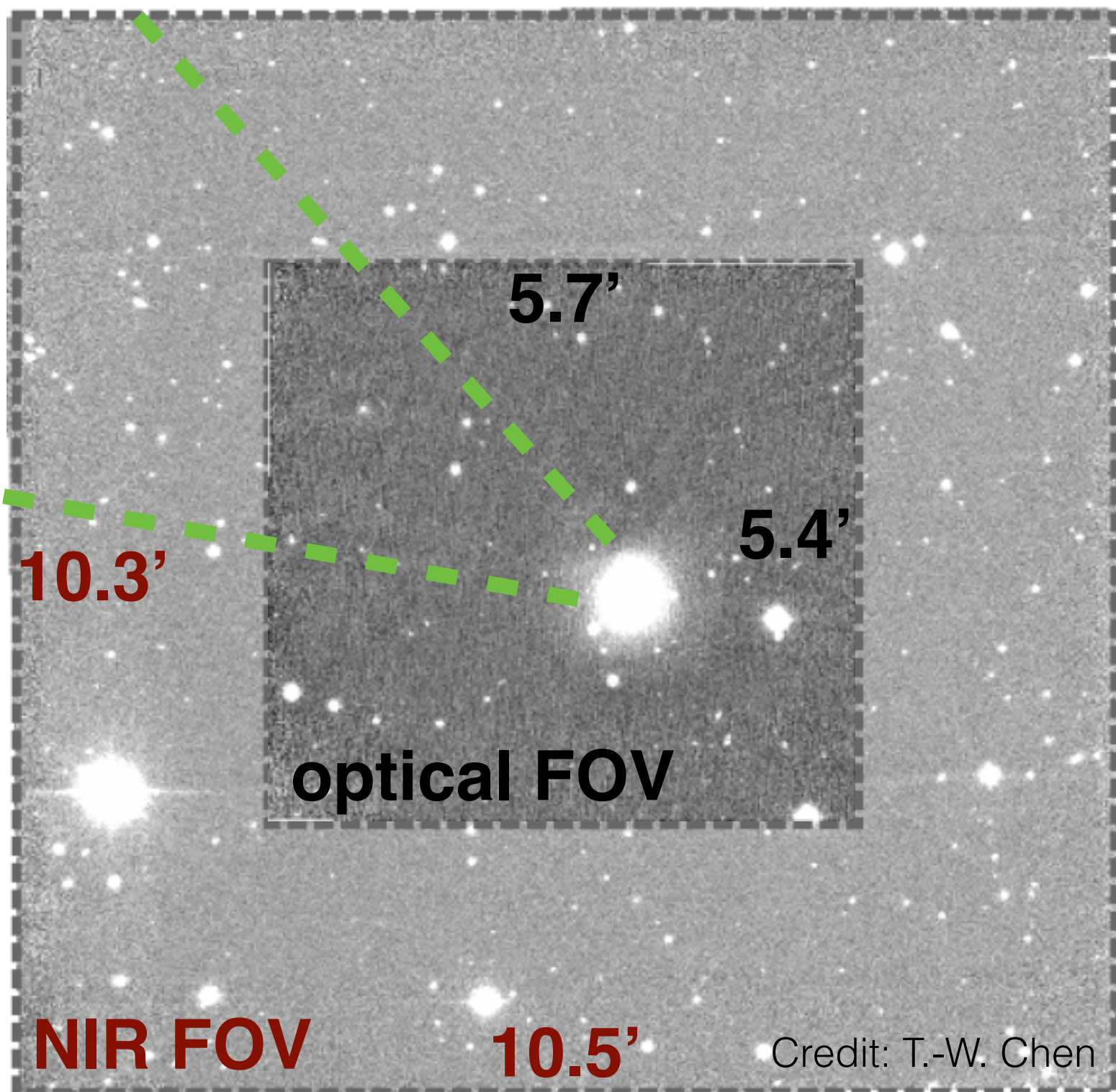
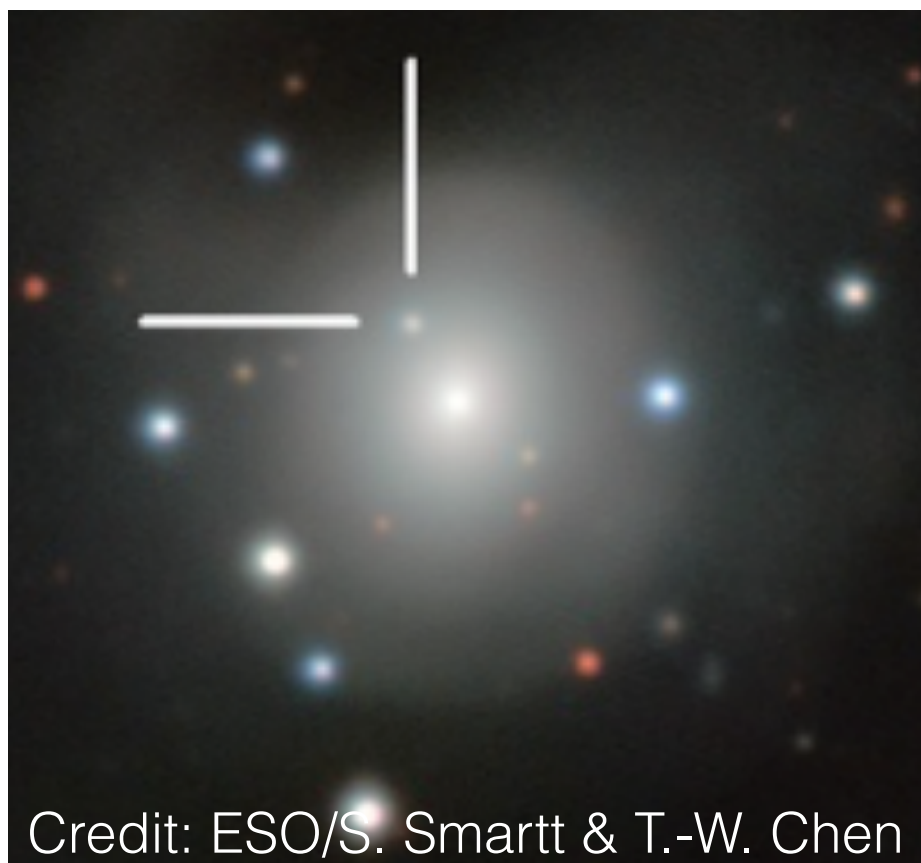
VIRCAM IMAGE

23:49:54

MUSE IFU



GROND image of the kilonova in NGC 4993



FOV & plate scale

optical: 5.7x5.4 arcmin; 0".158/pixel

NIR: 10.5x10.3 arcmin; 0".60/pixel

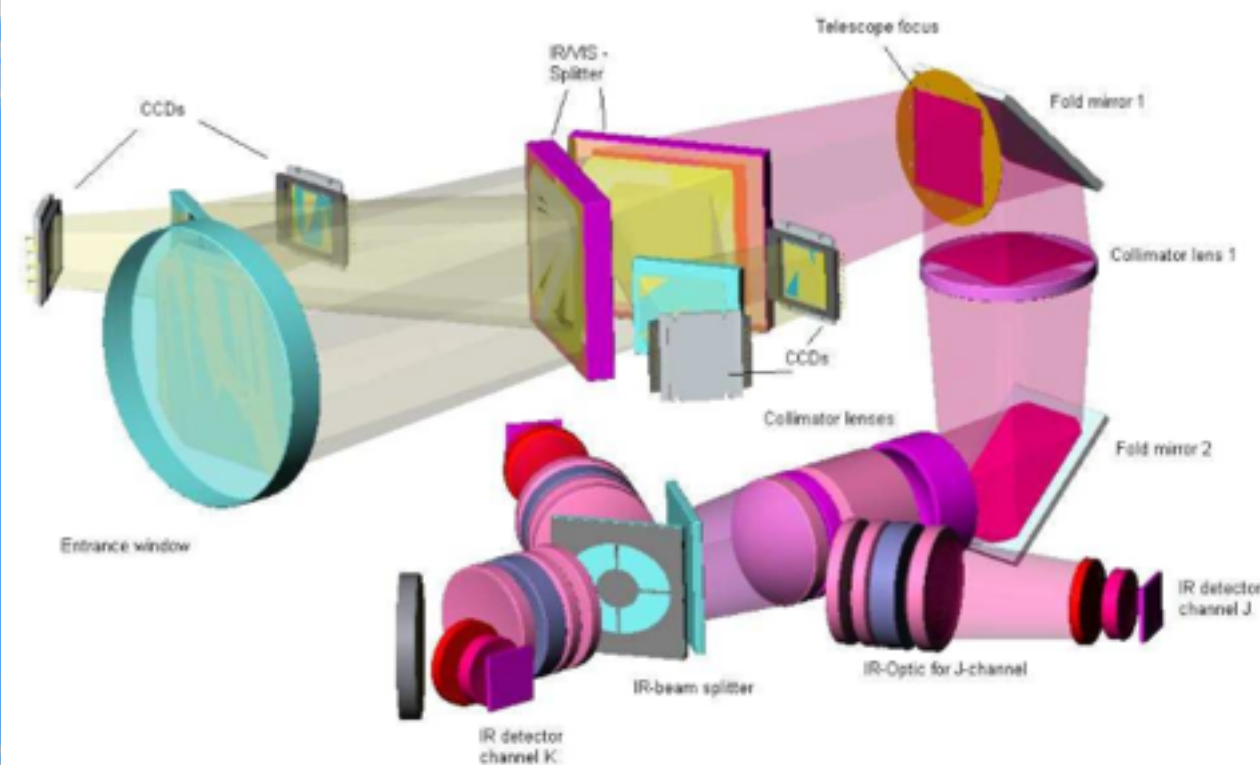
Credit: T.-W. Chen

GROND: a 7-channel imaging

- **G**amma-**R**ay burst **O**ptical/**N**ear-infrared **D**etector
- Simultaneous imaging in **g'r'i'z'JHK_s**
- **2.2m** MPG telescope at ESO La Silla observatory, Chile

SDSS standard stars field (2018-01-25)

OB	4-MIN
BAND	3S LIMITING MAGNITUDE
g'	24.1
r'	24.0
i'	23.2
z'	22.7
J	21.0
H	20.5
K _s	19.2

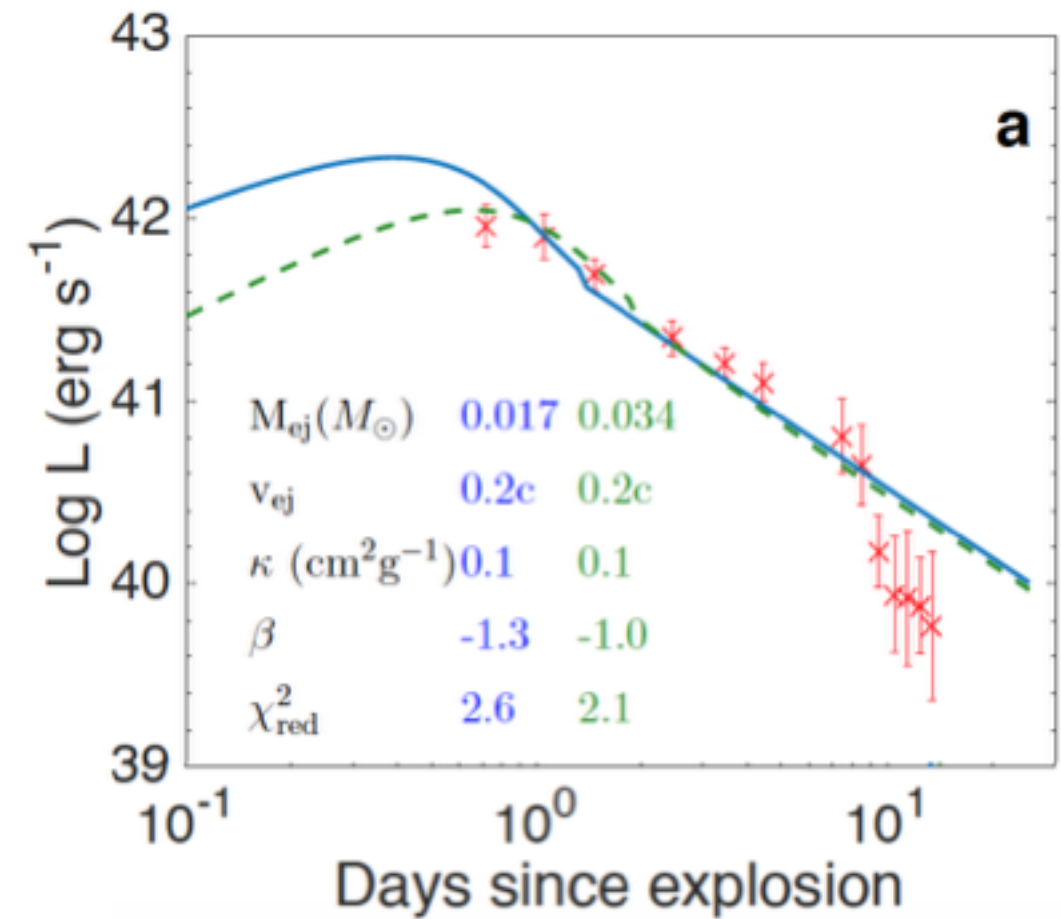
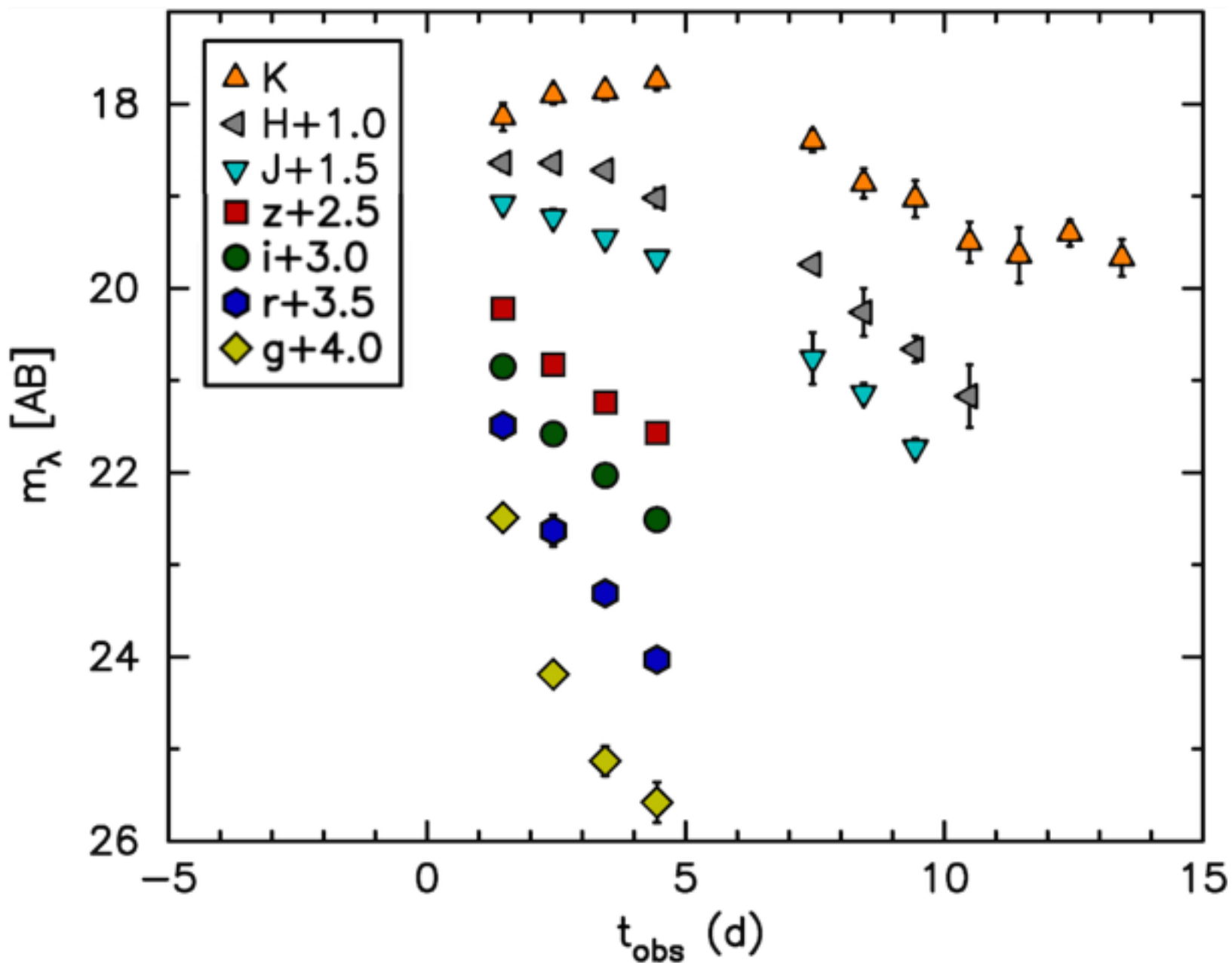


Greiner et al. 2008

all AB magnitudes, airmass 1, seeing 0.9''

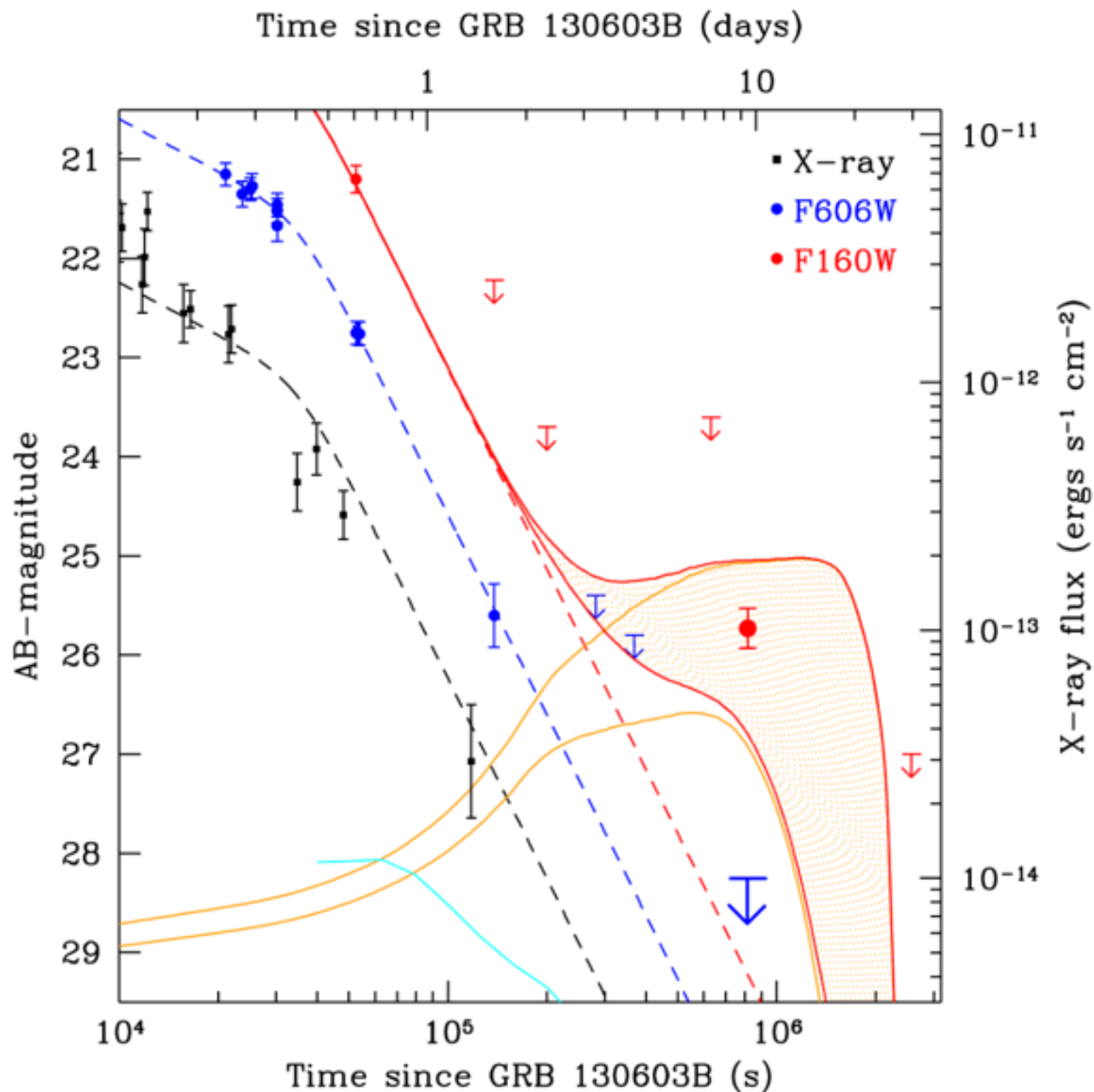
GROND observations of the kilonova

The GROND light curve & colour evolution are consistent with radioactive powering from r-process nuclides.

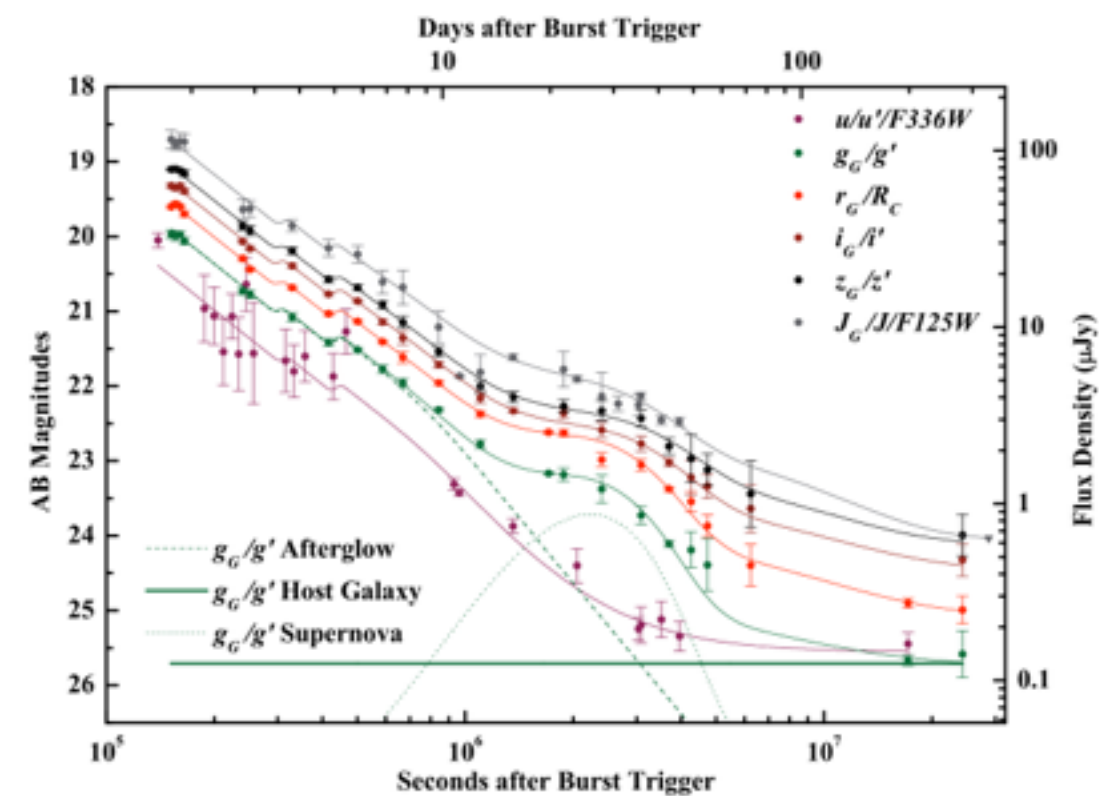


Smartt, Chen, Jerkstrand et al.
Nature, 2017, 551, 75

To separate the light...



GROND with 7-colour simultaneously is powerful to distinguish the GRB afterglow and the kilonova signal.

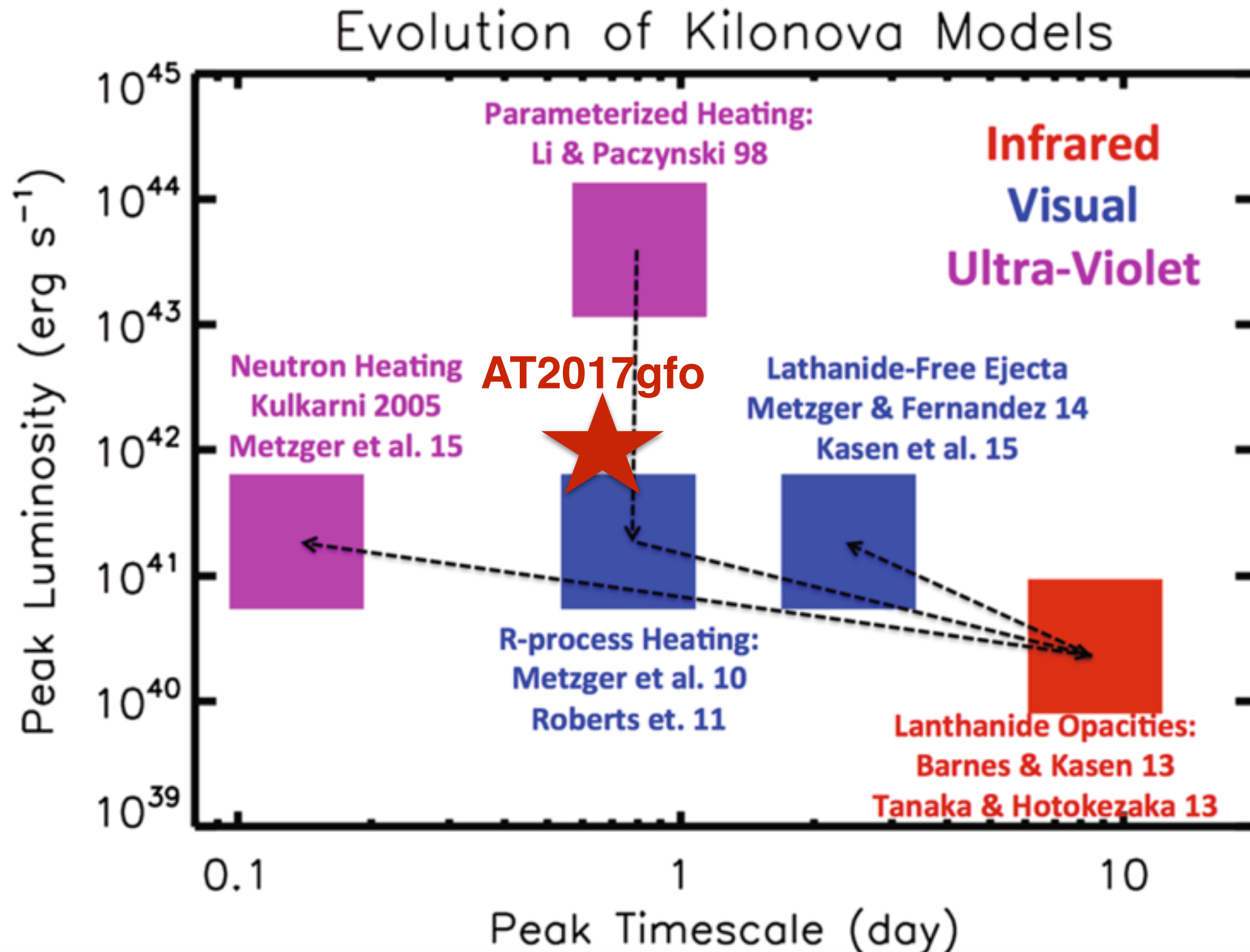


GRB 111209A/SN 2011ki
($z = 0.677$)
(Kann et al. 2017)

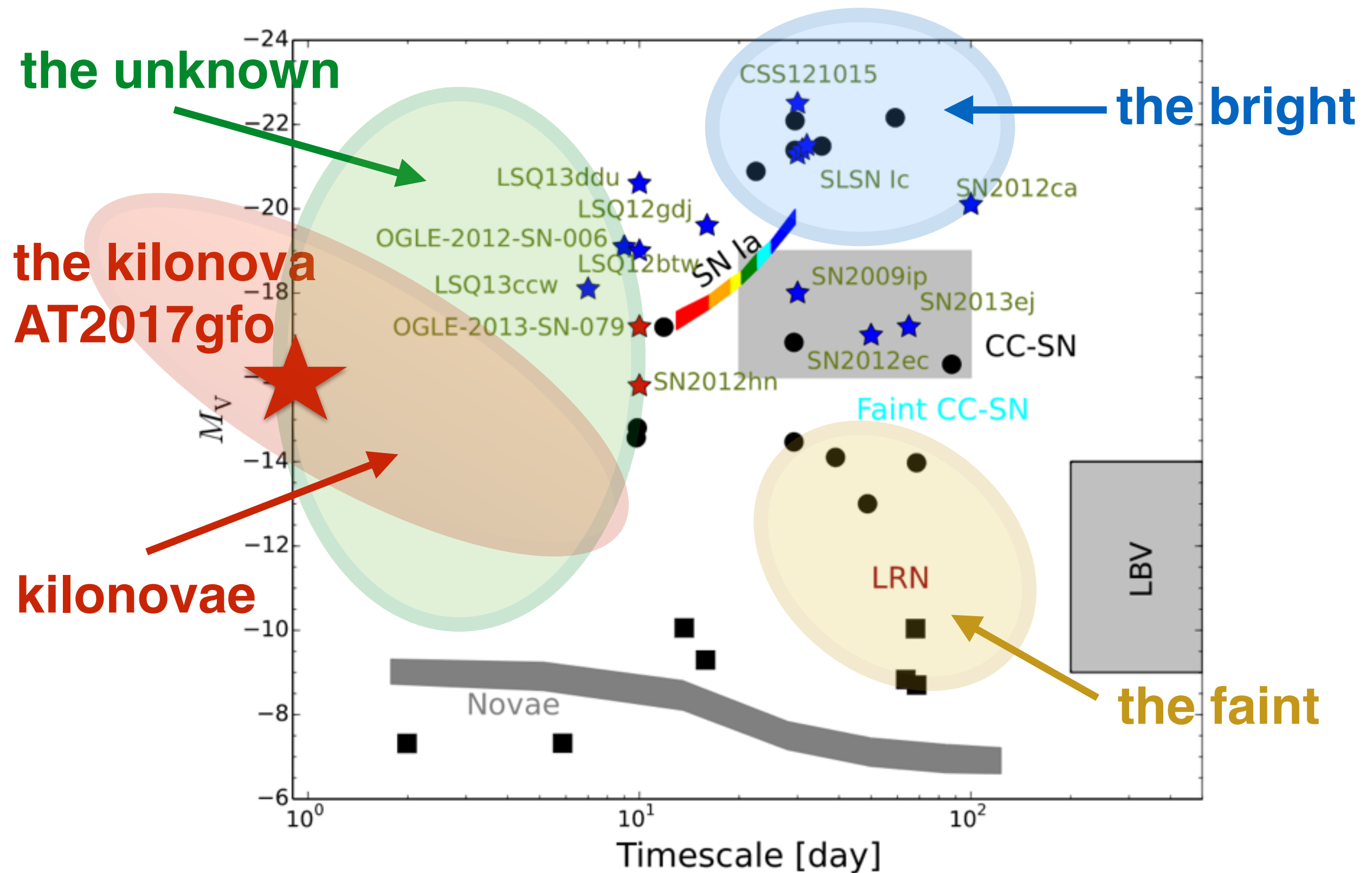
GRB 130603B ($z = 0.356$) (Tanvir et al. 2013)

Model predictions

As most r-process elements lack atomic data, opacity is highly uncertain



Observational space



Smartt et al. 2015 (originally developed by Kulkarni et al. 2007)

Summary

- GROND lightcurve of AT2017gfo is consistent with radioactive powering from r-process elements. Best fit of low opacity- a blue kilonova!
- GROND will followup the lightcurve evolution of kilonovae with g'r'i'z'JHK_s. The multi-band photometry is required to construct a bolometric lightcurve for physical study.
- GROND with 7-colour simultaneously is powerful to distinguish the GRB afterglow and the kilonova signal.
- To receive an alert of the discovery of counterparts as soon as possible is essential.
- A re-alluminisation activity of the telescope main mirror has been scheduled by MPIA for end of May.

Object visibility @La Silla

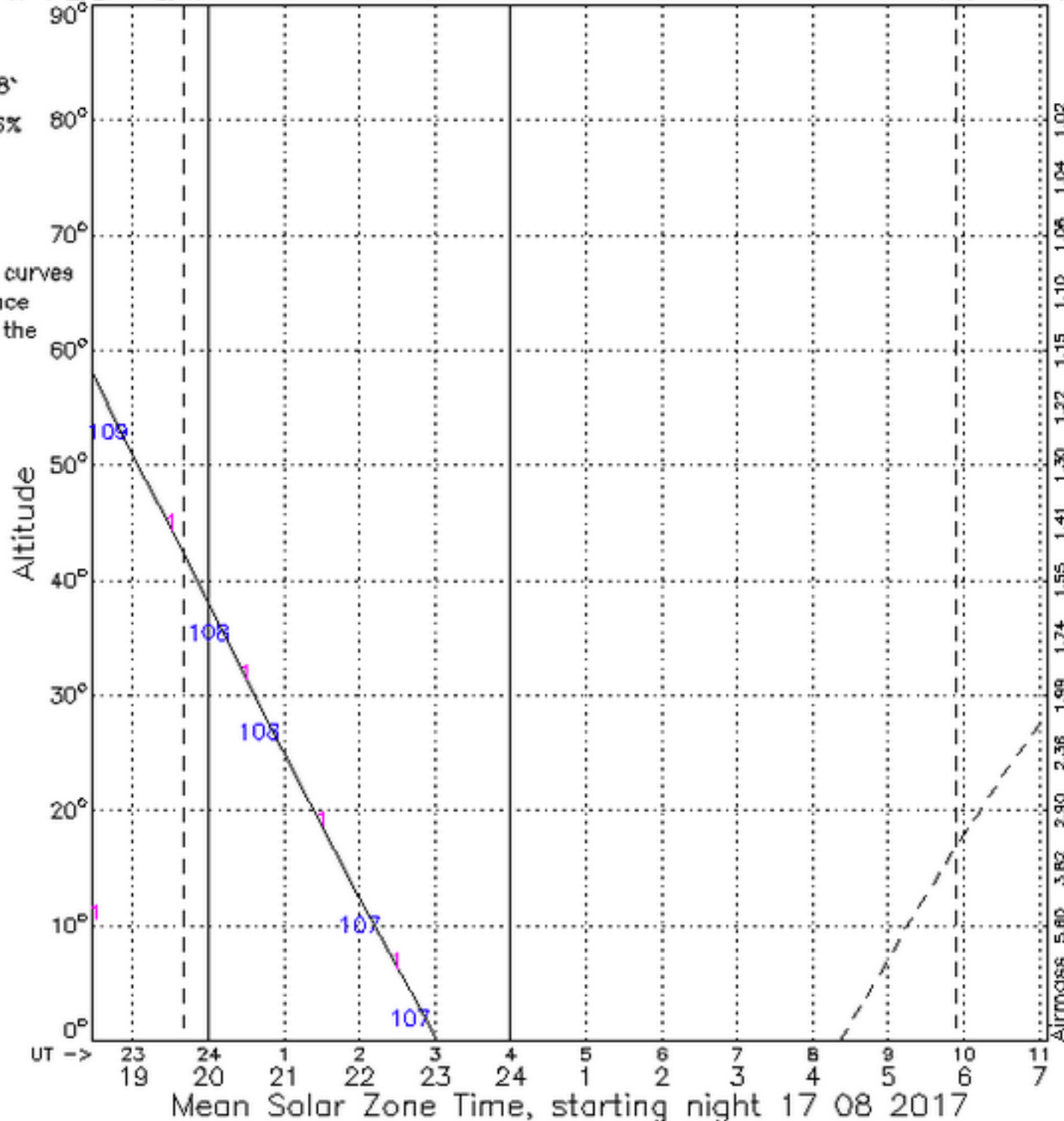
Altitudes, La Silla Observatory

289.2700E -29.2567N, 2347 m above sea level

LST ----> 17^h 3^m 18^h 3^m 19^h 3^m 20^h 3^m 21^h 3^m 22^h 4^m 23^h 4^m 0^h 4^m 1^h 4^m 2^h 4^m
 S.set Twil Twil S.rise
 UT -> 22^h 27^m 23^h 40^m 9^h 53^m 11^h 6^m

Moon (dashed):
 Coordinates:
 6^h 34^m +19° 28'
 Illumination: 16%
 Quarter: 4

Numbers below curves
 are Moon distance
 (in degrees) at the
 corresponding
 times.



Processed: 2017/10/18 at 07:40:14 UT. Isaac Newton Group of Telescopes, La Palma.

List of objects:
 1 BanJ10 13^h 9^m -23° 22'

keep it secret

- **17/08/18 01:05:23 GMT**
 GCN CIRCULAR #21529:
 LIGO/Virgo G298048:
 Potential optical
 counterpart discovered by
 Swope telescope

SSS17a

13:09:48.089 -23:22:53.35
 and had a brightness of
 i = 17.3 mag.

Danke schön!

Janet Ting-Wan Chen
email: jchen@mpe.mpg.de

