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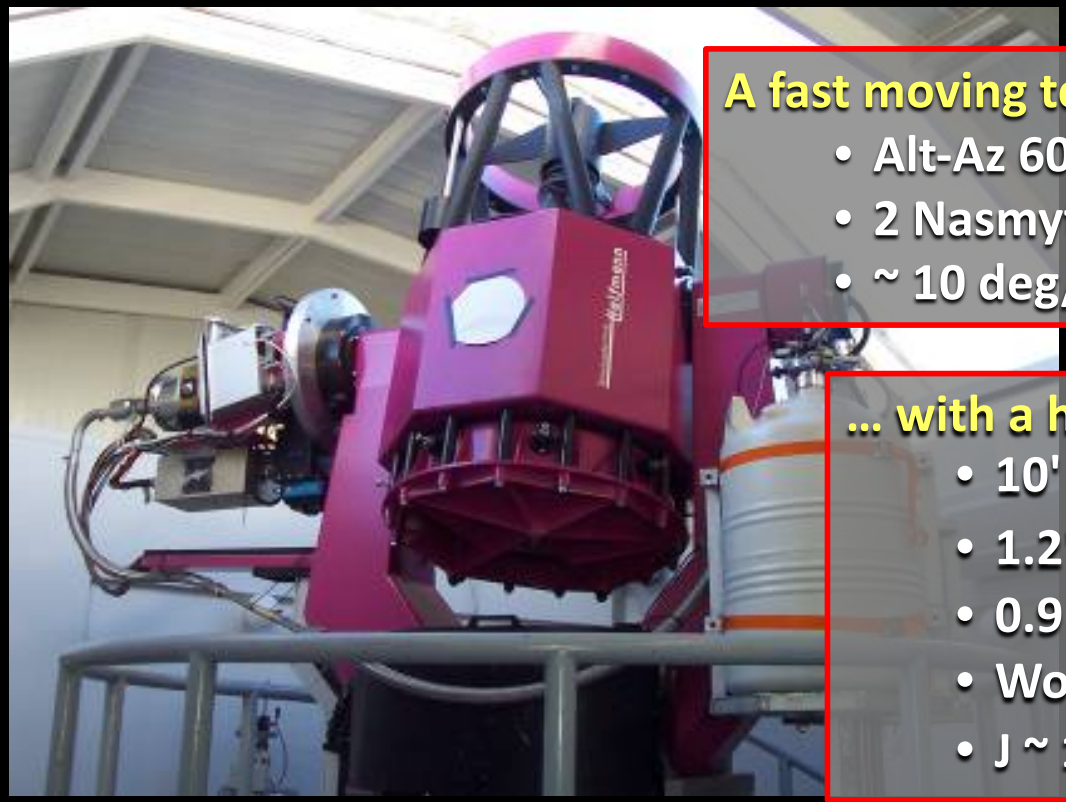
On behalf of GRAWITA

The **REM** (**R**apid **E**ye **M**ount) telescope: an Observatory for GRBs and other transient sources

WHAT is REM composed of ?



A fast moving telescope …

- Alt-Az 60 cm, f/8 focal ratio, mirror silver-coated
- 2 Nasmyth foci (one idle)
- ~ 10 deg/s – to any position in the sky in ~ 60 s

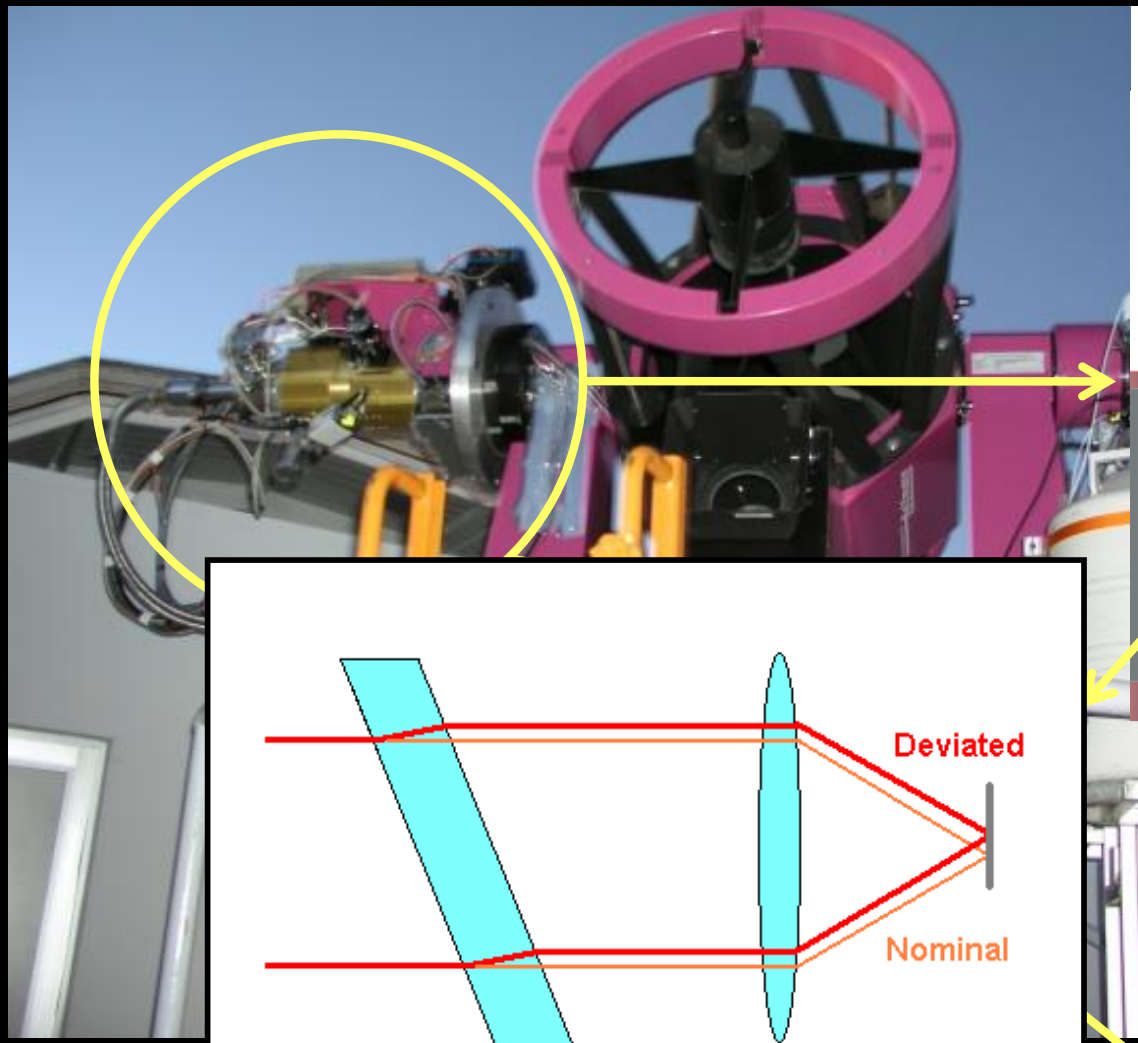
… with a high throughput NIR Camera: REMIR…

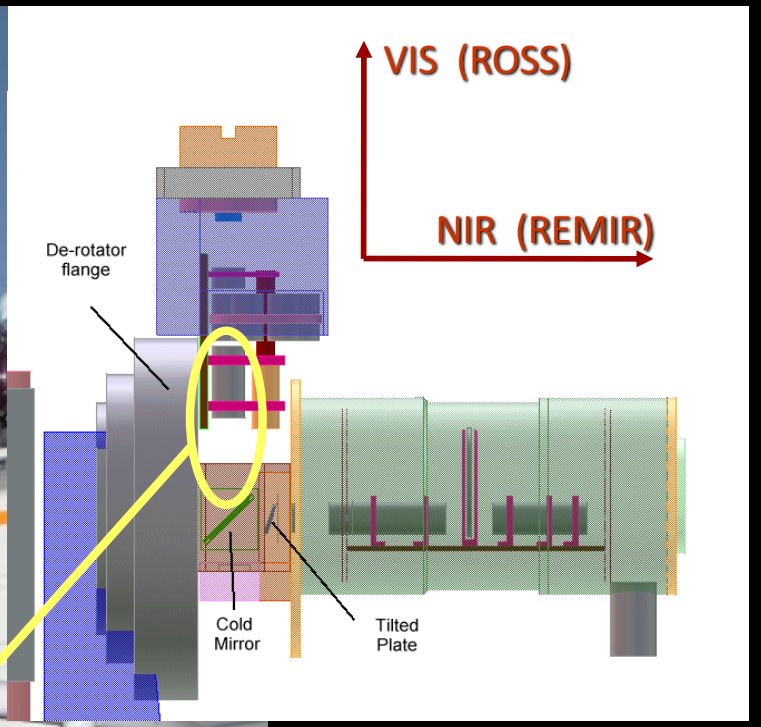
- 10' × 10' FoV
- 1.2" pixel scale
- 0.9 – 2.3 µm (z ', J, H, K_s)
- Wobbling plate for dithering
- J ~ 15.5 in 10 s, SNR ~ 10

… and an Optical Camera: ROS2

- 0.58" pixel scale
- ~ 10' × 10' FoV
- 4000 – 9500 Å (*g* ', *r* ', *i* ', *z* ')
- 4 channels simultaneously observed
- *r* ~ 19 in 10 s, SNR ~ 10

The REM instruments



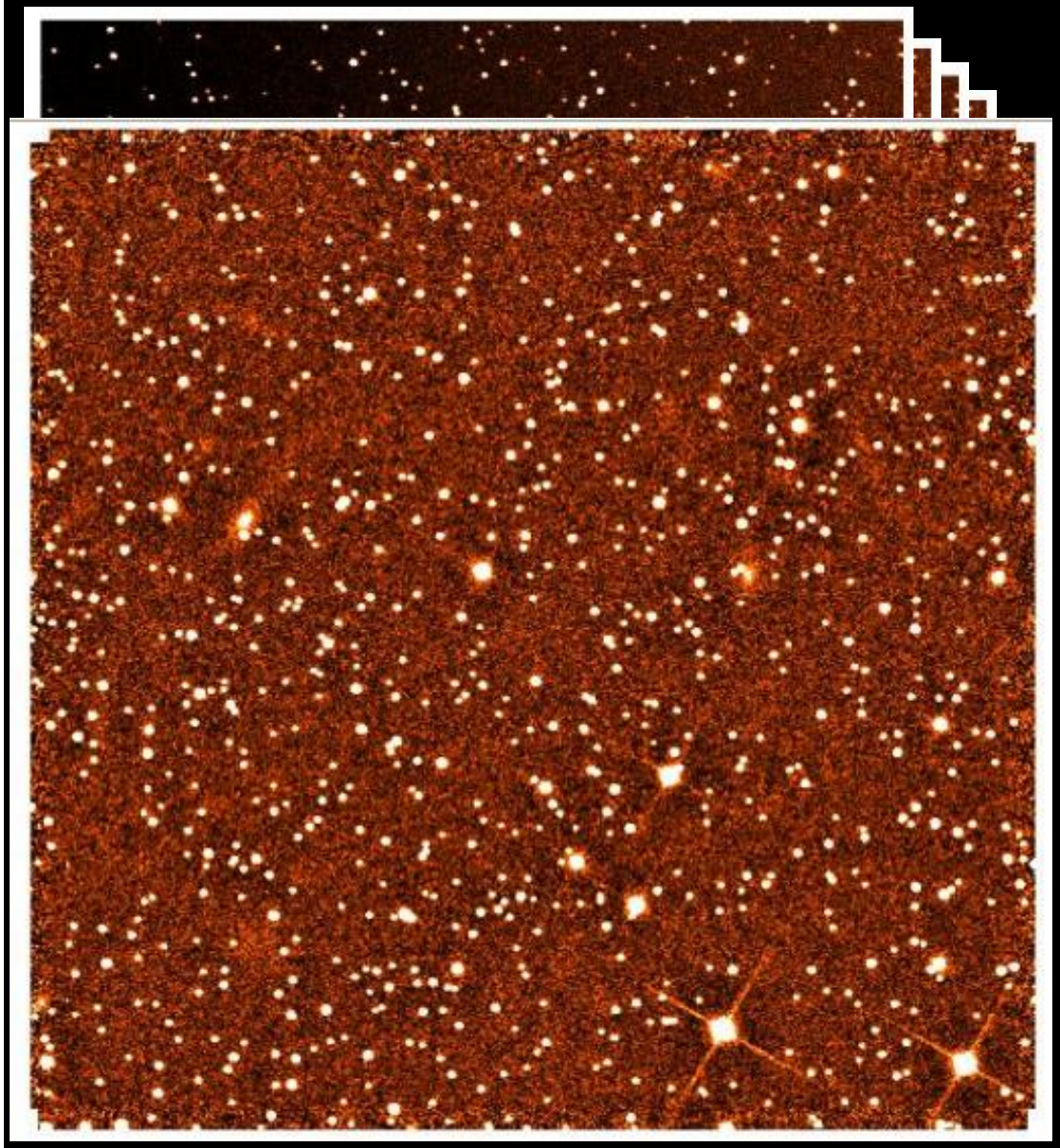


REMIR (*z* ',J,H,Ks)
ROS2 (*g* ',*r* ',*i* ',*z* ')
FOV: 10' × 10'

Simultaneous observations

g ', r, ' i ', z ' + 1 NIR band

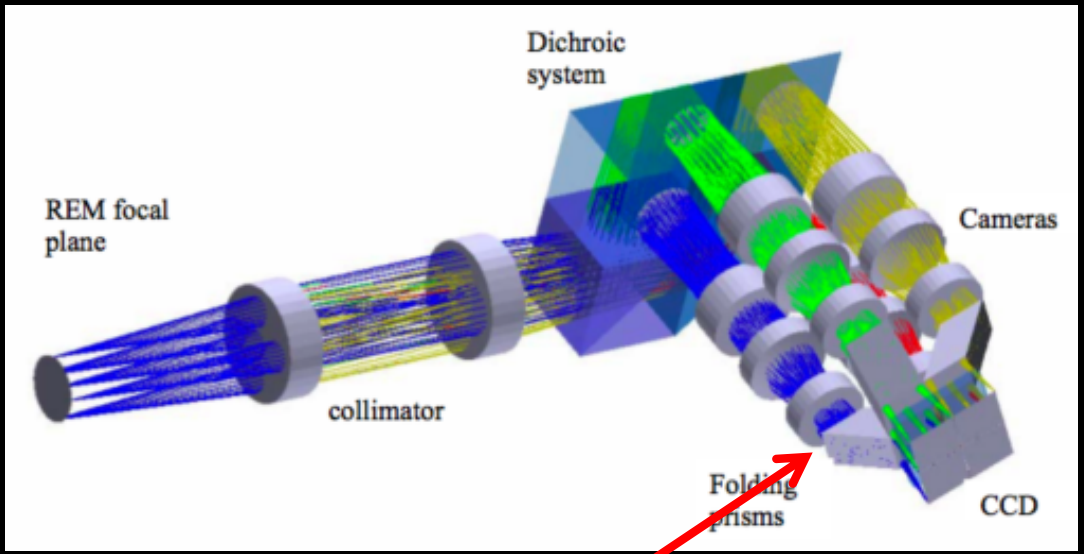
REMIR Observing Mode



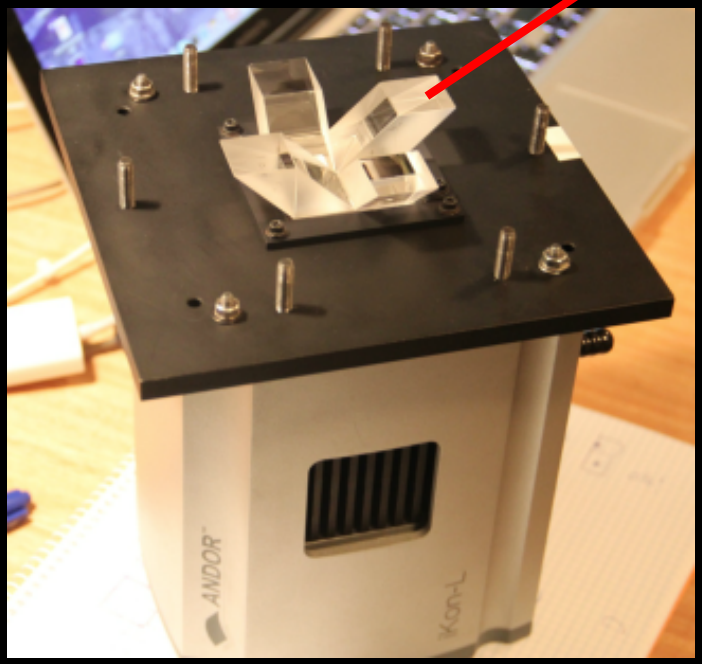
Sets of 5 dithered images are acquired in each REMIR band

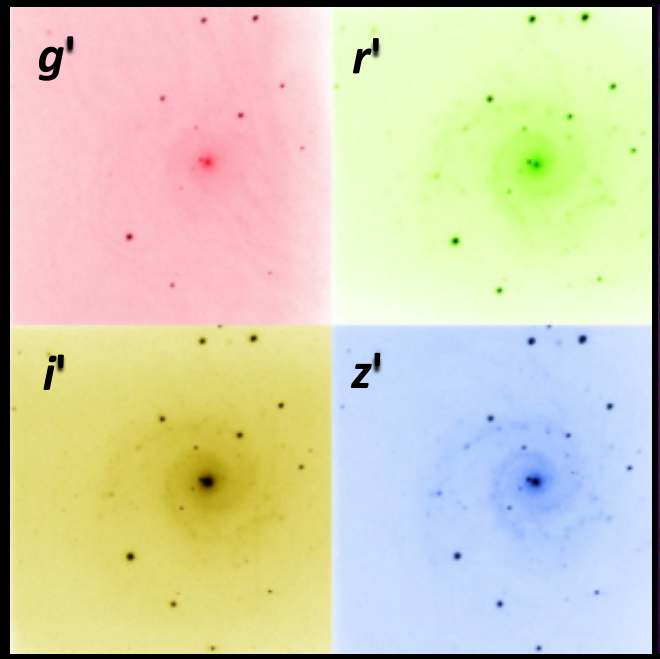
The five images are reduced and combined to produce a scientific and sky image

ROS2 Observing Mode



- Simultaneous four-band imaging
- split by plate dichroics + filters
- 4 quadrants of the same CCD





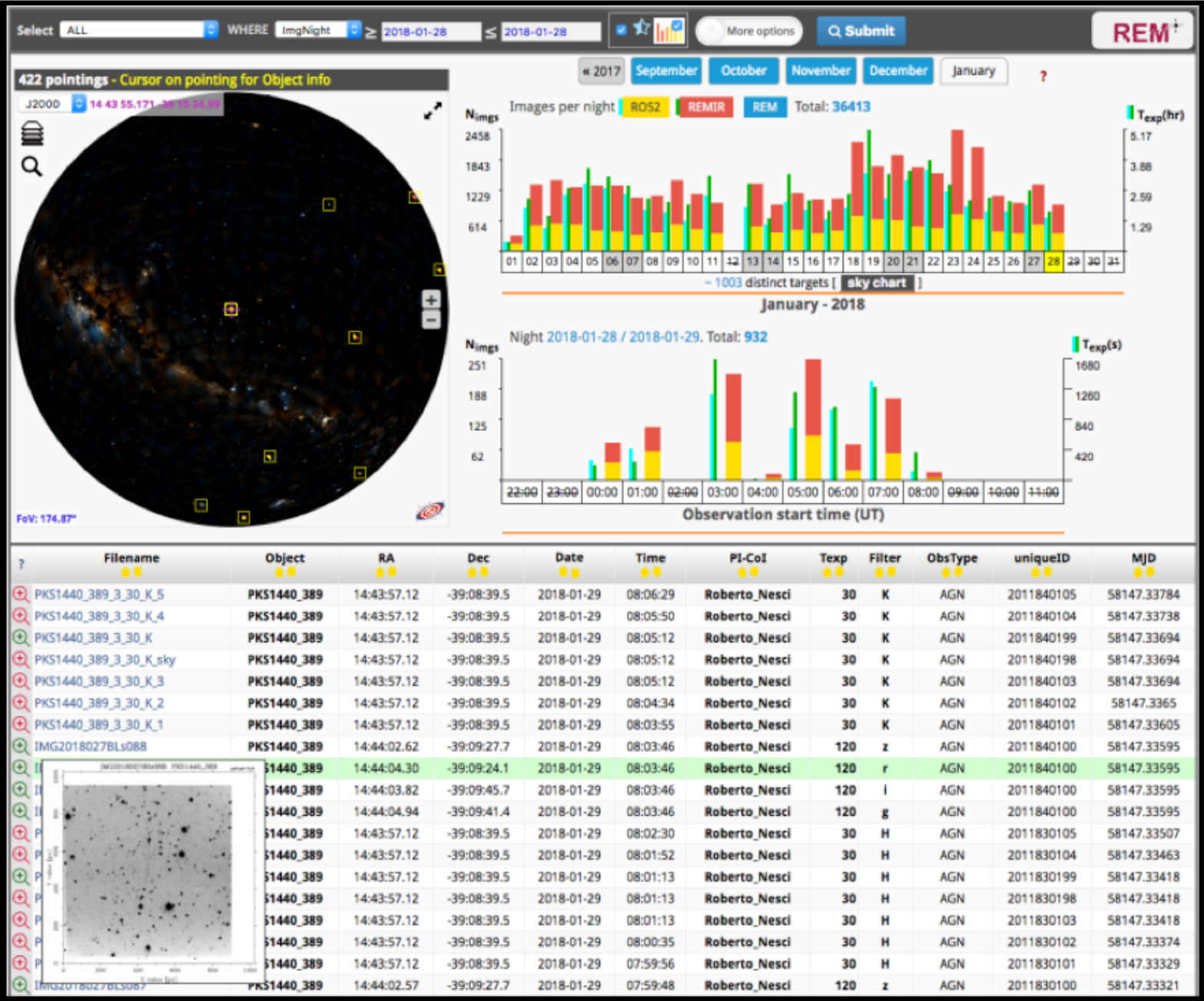
The REM Scheduler

- Observing procedure is completely robotic
- Nightly schedule is optimized for the observation of scheduled targets taking into account:
  - prioritized targets
  - time constraints
  - airmass
  - …….

The schedule is immediately overriden by GRB (or other) alerts.

Typically REM can observe the new target after 30 seconds from notification

The REM Archive



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	PKS1440_389_3_30_K_4	PKS1440_389	14:43:57.12	-39:08:39.5	2018-01-29	08:05:50	Roberto_Nesci	30	K	AGN	2011840104	58147.33738
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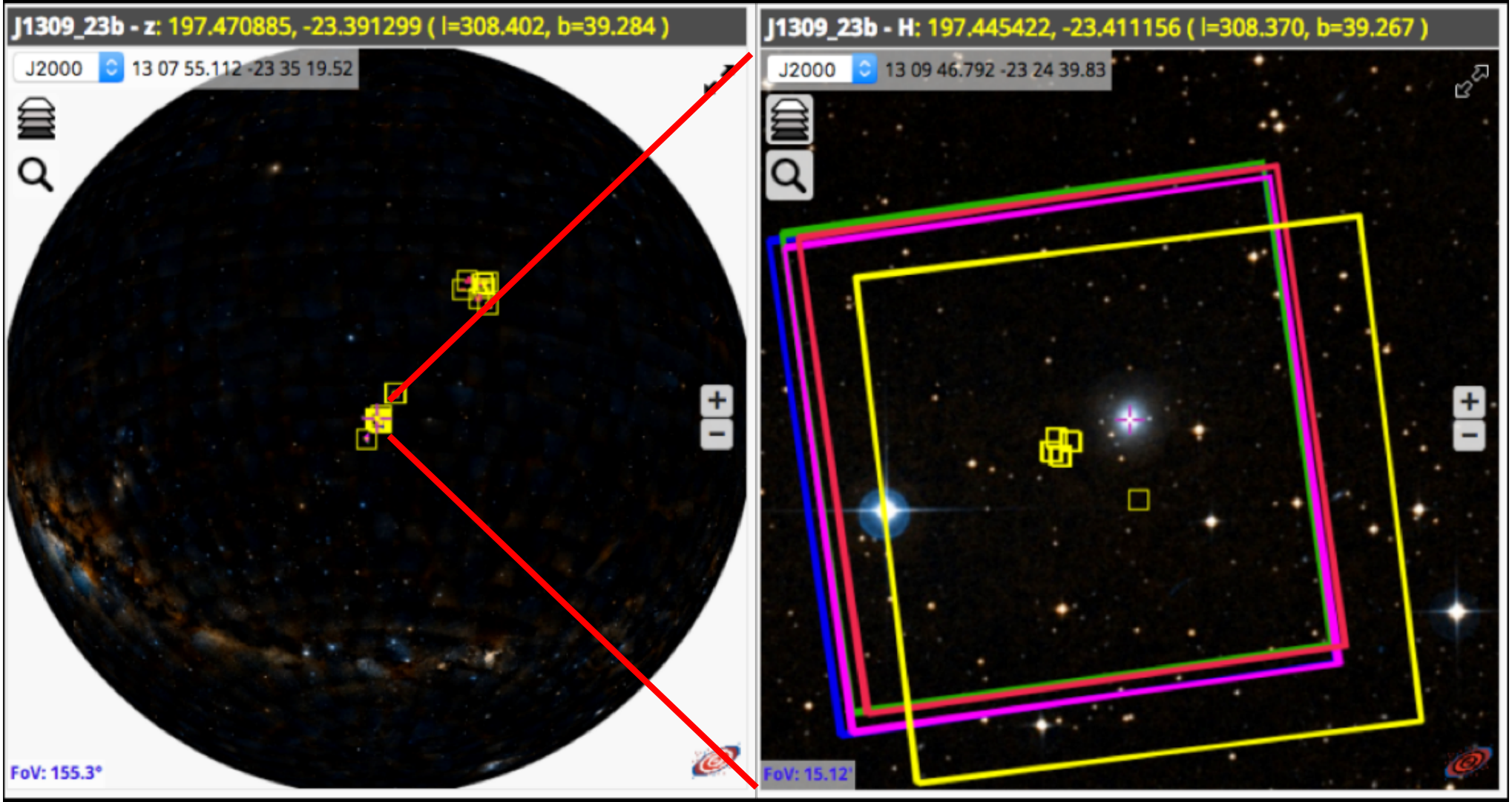
	P	1440_389	14:43:57.12	-39:08:39.5	2018-01-29	07:59:56	Roberto_Nesci	30	H	AGN	2011830101	58147.33329
	IMG2018027BLs087	PKS1440_389	14:44:02.57	-39:09:27.7	2018-01-29	07:59:48	Roberto_Nesci	120	z	AGN	2011830100	58147.33321

Credits: L. Nicastro

http://ross.iasfbo.inaf.it/REMDB/

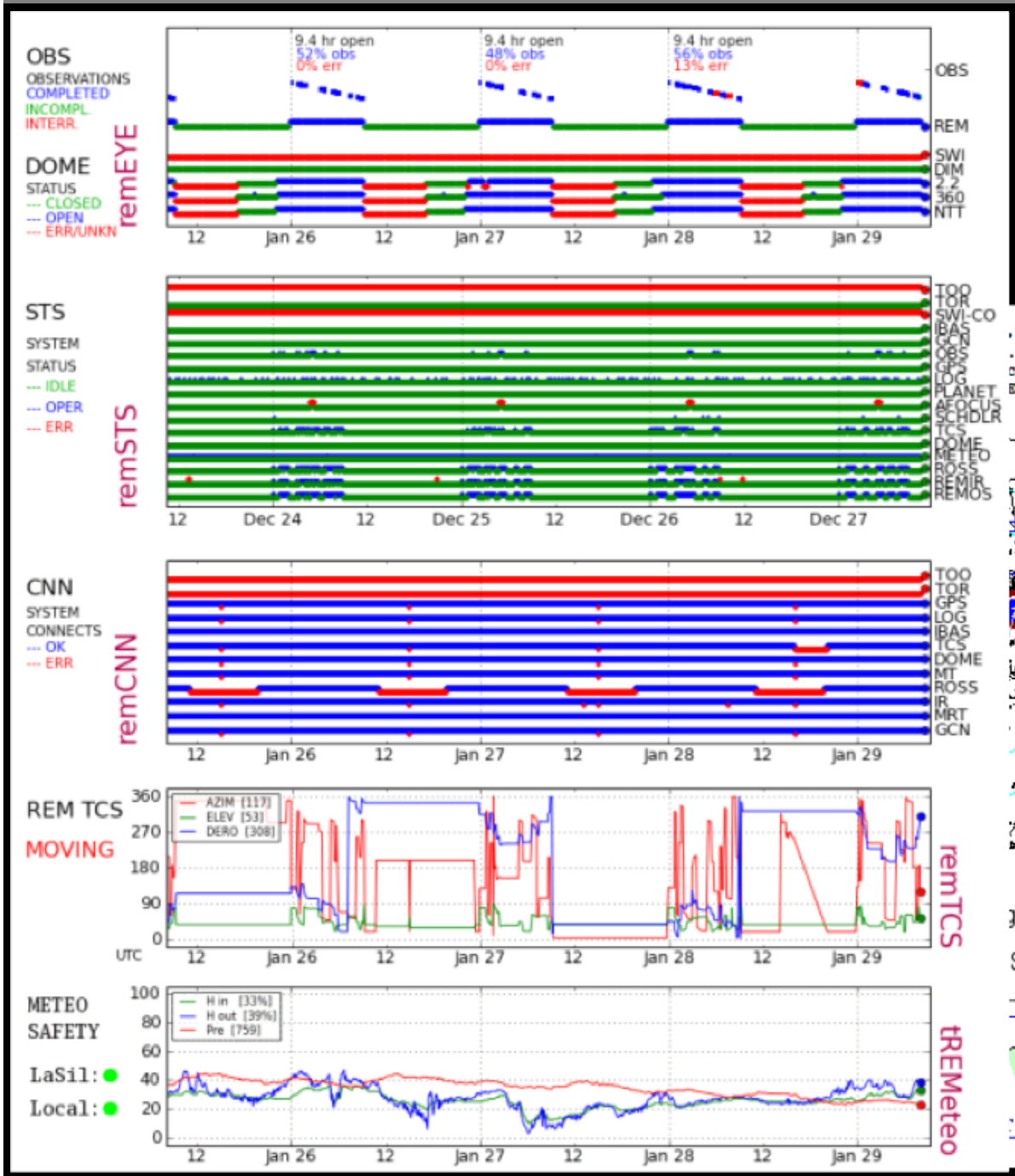
The REM Archive

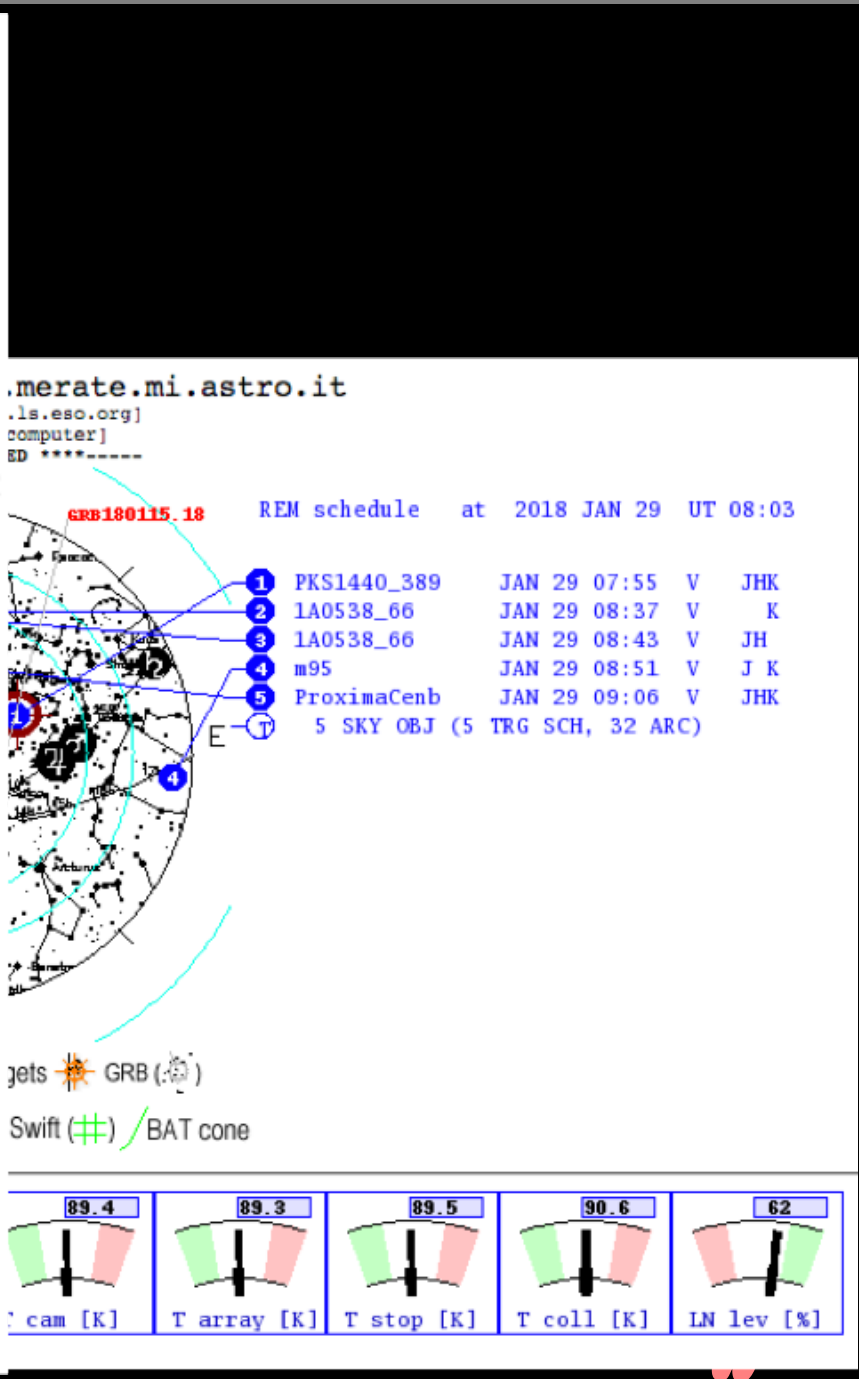


Credits: L. Nicastro

GW170817 and NGC 4993 fields

The tREMometer





REM Telescope Time

REM is offered to the astronomical community via INAF-TAC, Chilean CNTAC and OPTICON.

The GRAWITA team has an active proposal (P.I. S. Campana) aiming at contribute to the world-wide search for electromagnetic counterpart of gravitational wave triggers.

The GRAWITA Team

GRAvitational Waves Inaf TeAm

www.grawita.inaf.it

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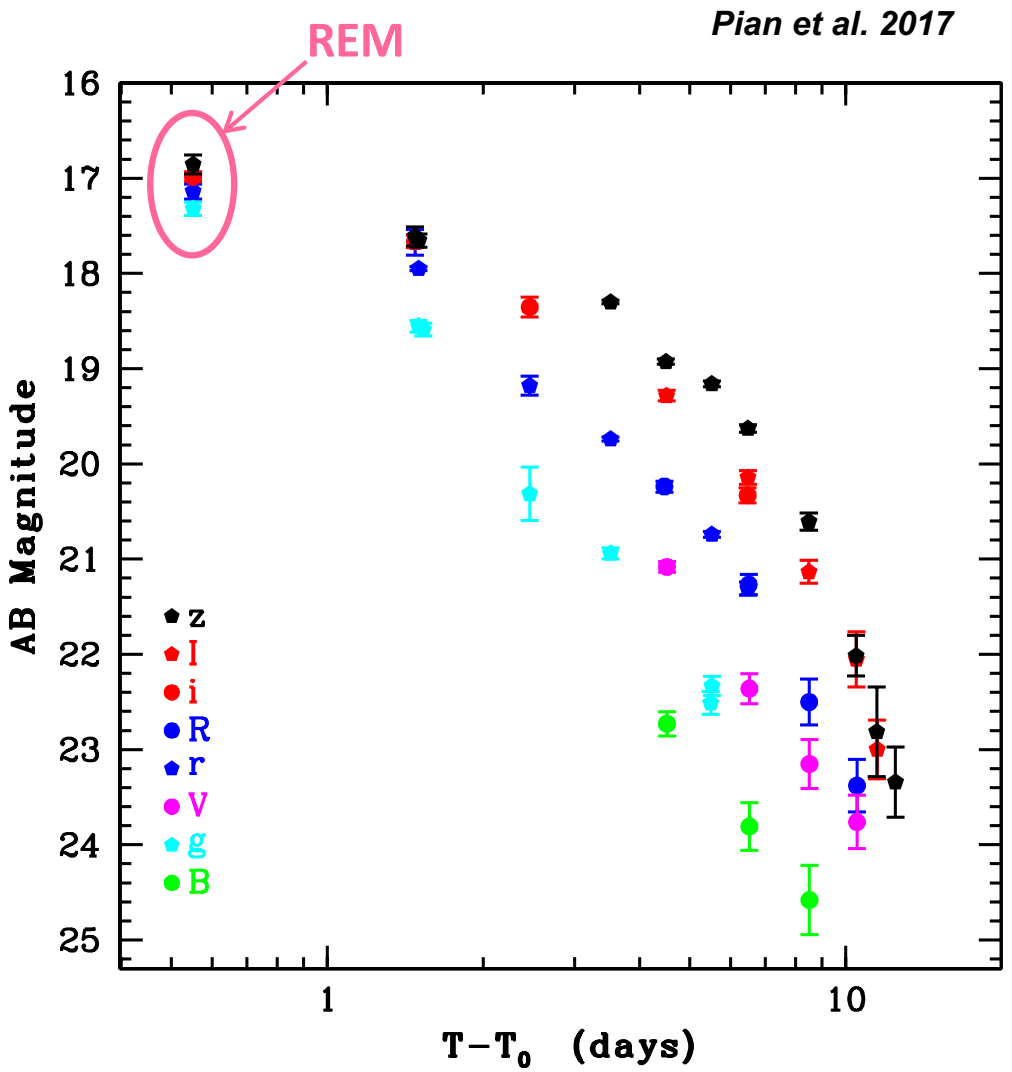
Observational Strategy



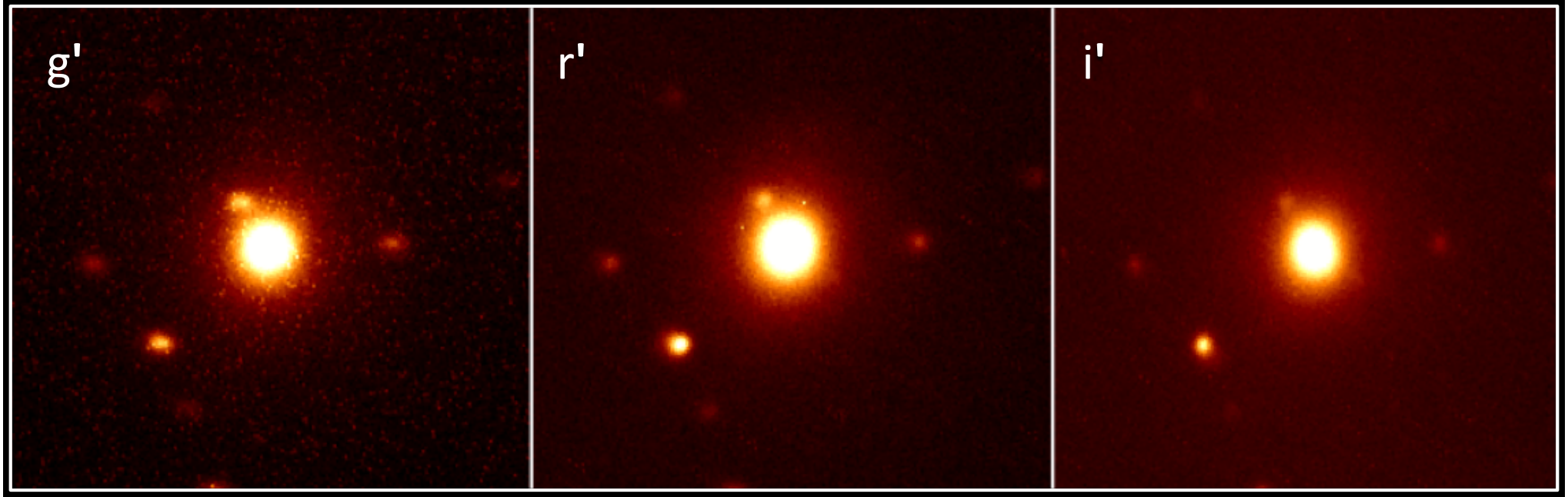
Observational Strategy

Two foreseen observational strategies depending on the GW trigger characteristics and/or on the results from other observing facilities

1. ***Galaxy targeting strategy:*** observe all putative bright ($r < 20$) host galaxies within the error region of a GW event, involving at least one neutron star, searching for new transients. A quick monitoring (3-5 min depending on target distance) of the observable galaxies will spot any new bright transient (e.g. GW170817).

2. ***Follow-up of EM counterpart candidates:*** provide spectral energy distribution (SED) of candidates counterparts of GW emitters coming from other large field of view observing facilities. Color selection and time evolution are effective to pinpoint the best candidates for larger telescopes follow-up. In this respect the fast observing as well as the multi-filter observational capabilities of REM are perfectly suited to this aim.

Observational Strategy



The blue kilonova counterpart of GW170817 in the early REM observations

Multi-wavelengths Facilities Network

***Visible**: VST, LBT, TNG, NOT (coll.), NTT, VLT + small telescopes [REM, 1.82m (Asiago, IT), 1.52m (Loiano, IT), 0.9m C. Imperatore, IT)] + HST (coll.)*

***Near-mid IR**: 1.1m AZT-24 (C. Imperatore,IT), IRAIT (Antarctica)*

***Radio**: 64m SRT (Cagliari, IT), 2x 32m (Medicina and Noto, IT)*

***High energy (coll.)**: space(Swift, Chandra, XMM) + ground (coll. MAGIC, future ASTRI, CTA)*

***Collaborations**: **ePESSTO,** INTEGRAL, AGILE*

***Positive interactions during O1+O2**: Pan-Starrs, iPTF, VISTA, HST .....*

Conclusions

- Galaxies monitoring , color selection and time evolution are effective to pinpoint the best candidates. In this respect the fast observing as well as the multi-filter observational capabilities of REM are perfectly suited to this aim.

- The results we obtained on GW170817, prove that the REM telescope, combined with the facilities GRAWITA have access to, represents an invaluable asset in the search and characterization of EM candidate counterparts of GW signals.


Thanks