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# OSB 4 MMO: Multi Messenger Observations

Division 4 Multi Messenger Observations

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## Div4 - Multi Messenger Observations

Investigate the MM science cases offered by the detections and follow up of the Electromagnetic Counterparts of GW sources detected by ET

WP1: acquire and/or develop predictions of EM counterparts of ET-GW sources

WP2: survey the expected or desired facilities to discover and study ET-GW counterparts

**Section 1:** State of the art: observational picture and strategies

- 170817 what we have learned
- GRBs and KN as counterparts of CB mergers
- Search strategies and follow up strategies based on past/current experience

**Section 2:** Modelling the EM counterparts of ET detected CB mergers

## 2.1 Population synthesis models:

- BNS merger population synthesis code → EM emission (KN, GRB)
- BHNS merger population synthesis code → EM emission (KN, GRB)

## 2.2 EM emission component detectability (generic bands/limiting sensitivity)

- Kilonova
- GRB prompt and afterglow

**Section 3:** Observational facilities/strategies

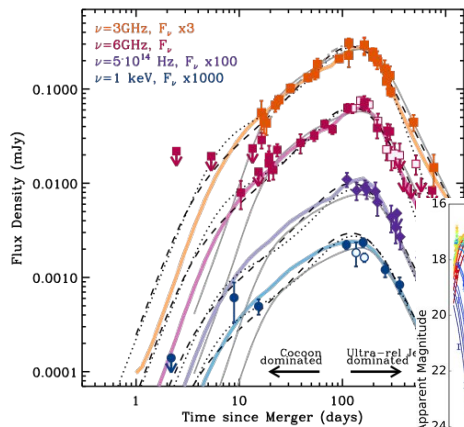
- The ET change of paradigm on EM counterpart search and characterisation
- Expected EM facilities (2035 survey)
- Examples of Performances on (2)
- Requirements, needs, etc.

**Section 1:** State of the art: observational picture and strategies

**Section 2:** Modelling the EM counterparts of ET detected CB mergers

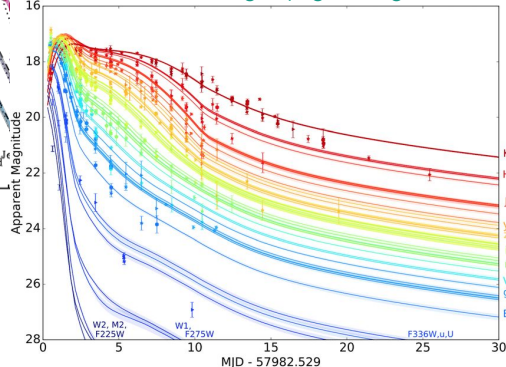
**Section 3:** Observational facilities/strategies

GRB afterglow (e.g. Margutti & Chornok 2020)

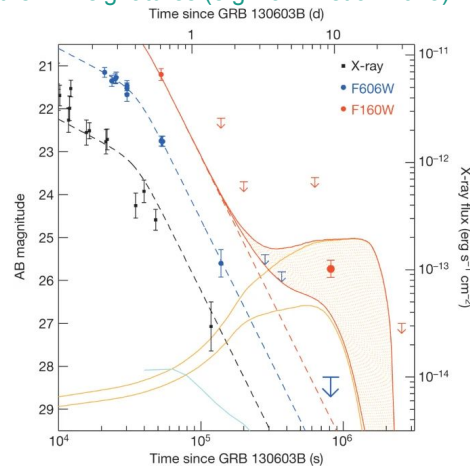


Some examples (not necessarily these)

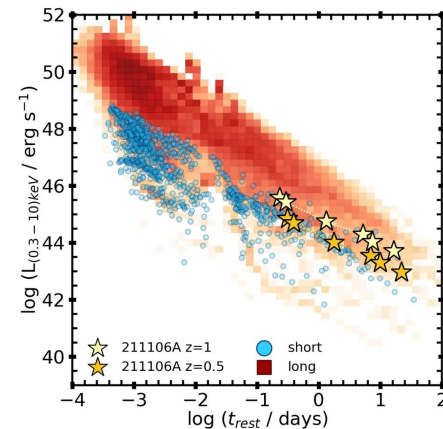
Kilonova 2017gfo (e.g. Metzger et al. 2020)



Other KN signatures (e.g. Tanvir et al. 2013)



Short GRBs (e.g. Laskar et al 2022)

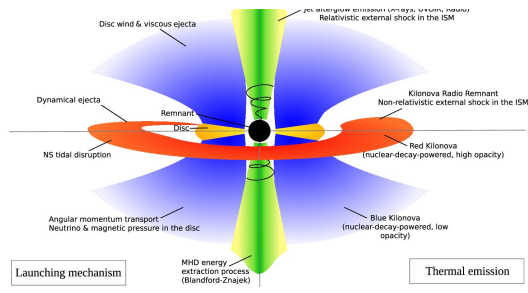


Section 1: State of the art: observational picture and strategies

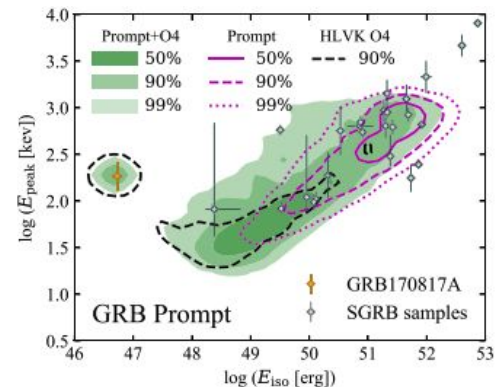
Section 2: Modelling the EM counterparts of ET detected CB mergers (BNS, BHNS)

Section 3: Observational facilities/strategies

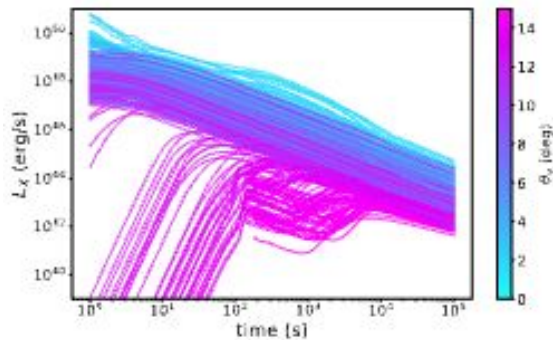
Outflow/EM emission components (e.g. Barbieri+2020)



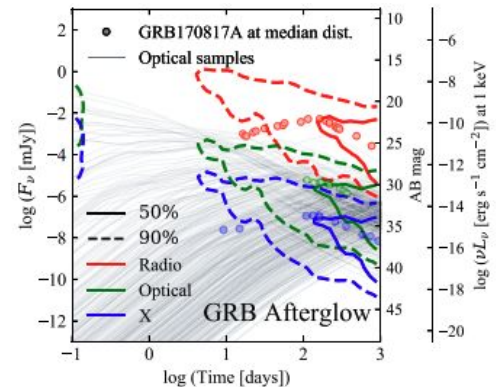
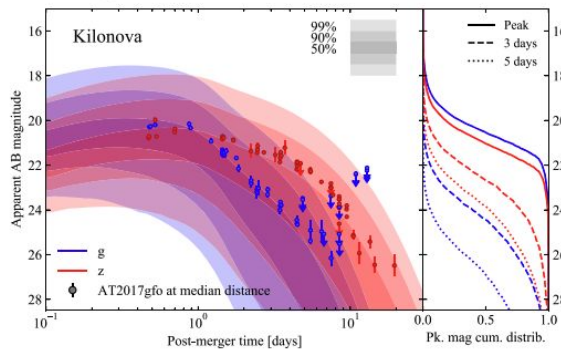
Codes description



Example plots (Ronchini+2022)



Example plots (Colombo+2022)

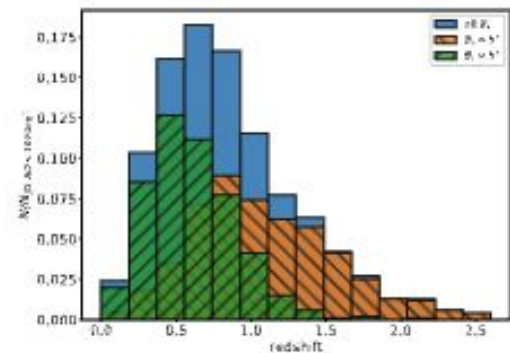
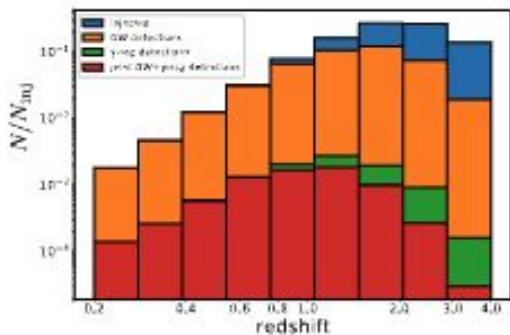


Section 1: State of the art: observational picture and strategies

Section 2: Modelling the EM counterparts of ET detected CB mergers

Section 3: Observational facilities/strategies

Example plots (Ronchini+2022)



Expected EM facilities 2035 (survey)

	FoV	Sens	Range	Resol	ToO	Survey	Data policy
SKA							
VRO							
ELT/Harmoni							
...							
VLT ...							
...							
SVOM							
Theseus							
...							
CTA ...							