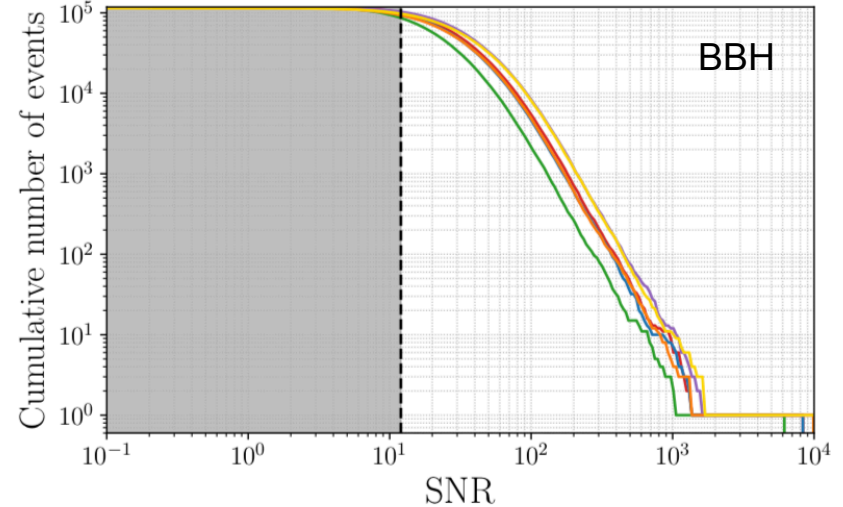
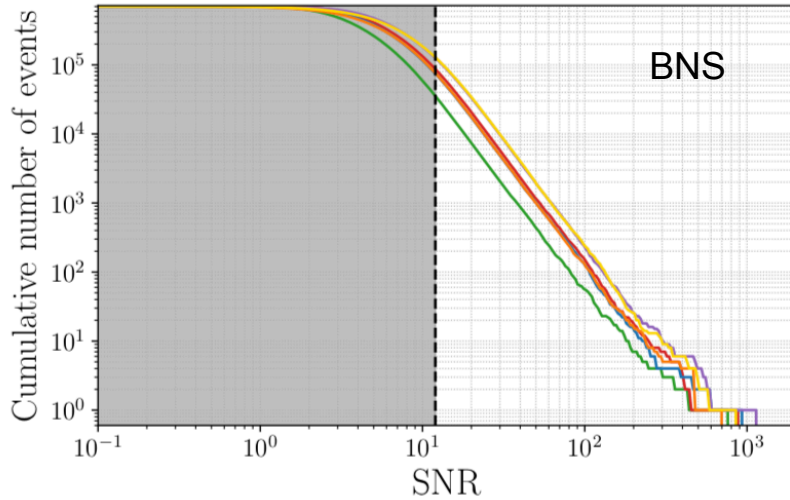


# A few ET numbers



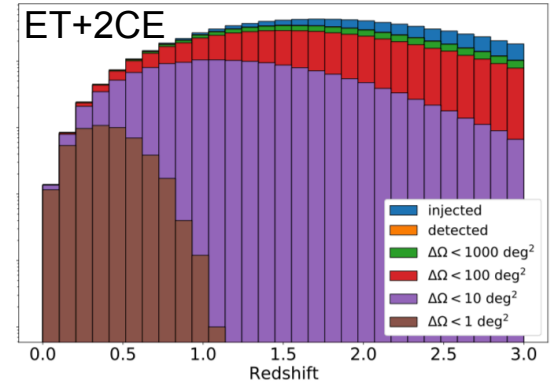
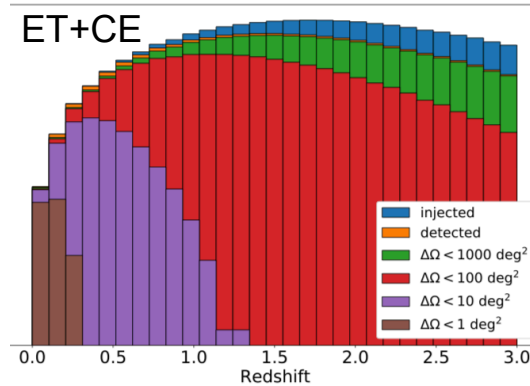
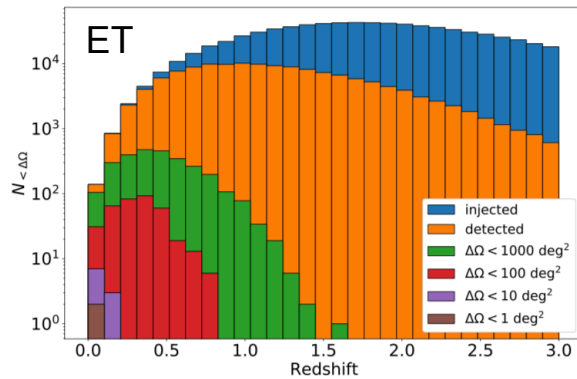
Branchesi, Maggiore et al. 2023, JCAP

$10^5$  BNS alerts per year  
 $10^5$  BBH alerts per year



A few tens of alerts per hour  
Overlapping signals

# Sky-localization



Ronchini, A&A 2022

- ET:  $O(100)$  detections per year with sky-localization (90% c.r.)  $< 100$  sq. deg
- ET+CE:  $O(1000)$  detections per year with sky-localization (90% c.r.)  $< 10$  sq. deg
- ET+2CE:  $O(1000)$  detections per year with sky-localization (90% c.r.)  $< 1$  sq. deg

Branchesi, Maggiore et al 2023, JCAP  
Iacovelli et al. 2022, ApJ

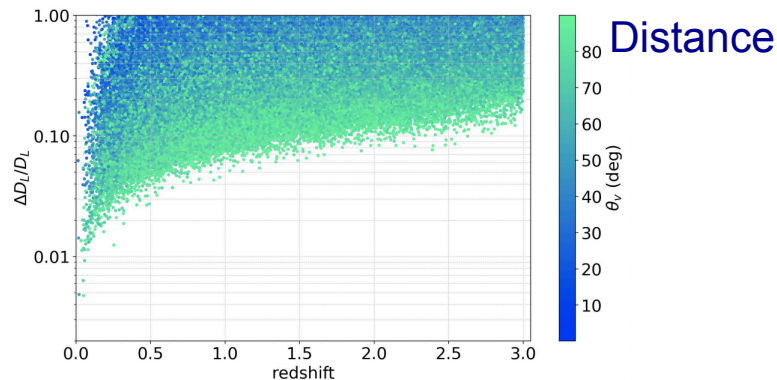
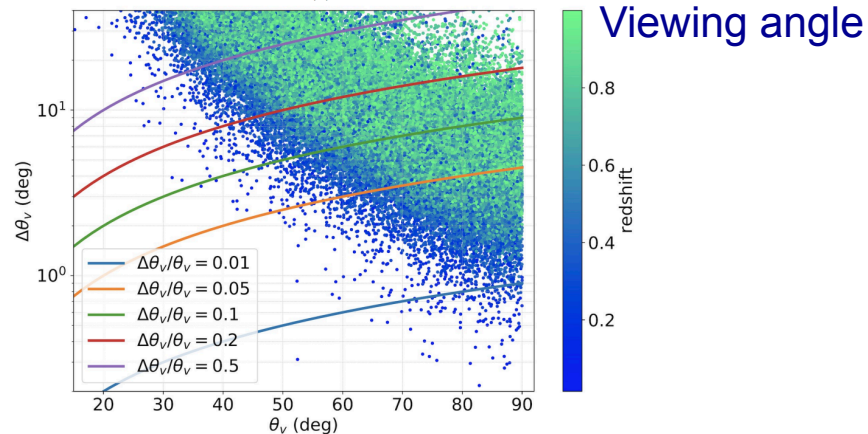
# Prioritization of the triggers to be followed

## Sky-localization

	ET	ET+CE	ET+2CE
$N_{\text{det}}$	143970	458801	592565
$N_{\text{det}}(\Delta\Omega < 1 \text{ deg}^2)$	2	184	5009
$N_{\text{det}}(\Delta\Omega < 10 \text{ deg}^2)$	10	6797	154167
$N_{\text{det}}(\Delta\Omega < 100 \text{ deg}^2)$	370	192468	493819
$N_{\text{det}}(\Delta\Omega < 1000 \text{ deg}^2)$	2791	428484	585317

Too large numbers of triggers well localized to be followed-up

Send in low-latency source parameters and continuous updates

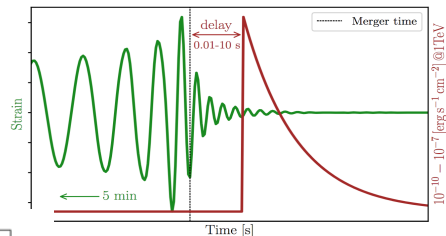


# Early warning alerts

## ET alone

Branchesi, Maggiore et al. 2023, JCAP

Configuration	$\Delta\Omega_{90\%}$	All orientation BNSs			BNSs with $\Theta_v < 15^\circ$		
	[deg <sup>2</sup> ]	30 min	10 min	1 min	30 min	10 min	1 min
$\Delta 10\text{km}$	10	0	1	5	0	0	0
	100	10	39	113	2	8	20
	1000	85	293	819	10	34	132
	All detected	905	4343	23597	81	393	2312
2L 15 km misaligned	10	0	1	8	0	0	0
	100	20	54	169	2	7	26
	1000	194	565	1399	23	73	199
	All detected	2172	9598	39499	198	863	3432

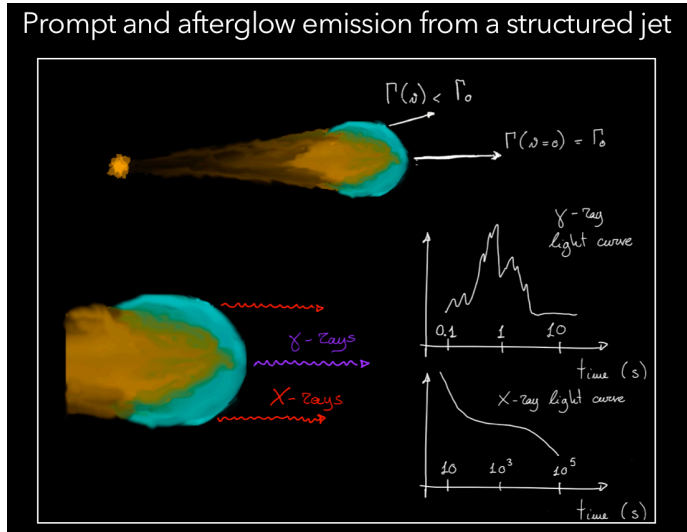


Five minutes before the merger, a **factor 10 higher number of well-localized events** when ET operates in a network of next generation GW detectors

Banerjee et al. 2023, A&A  
 Yufeng et al. 2022, PhRvD  
 Nitz & Dal Canton 2021, ApJ  
 Hu & Veitch, 2023 arXiv:2309.00970

# Examples of joint numbers

Prompt and afterglow emission from a structured jet



## GRB: gamma/X-ray

RELATIVISTIC JET PHYSICS,  
GRB EMISSION MECHANISMS,  
COSMOLOGY and MODIFIED GRAVITY

COSMOLOGY and MODIFIED GRAVITY

Ronchini et al., A&A 2022

Almost all detected short GRB will have a GW counterpart around 70% ET and 95% ET+CE

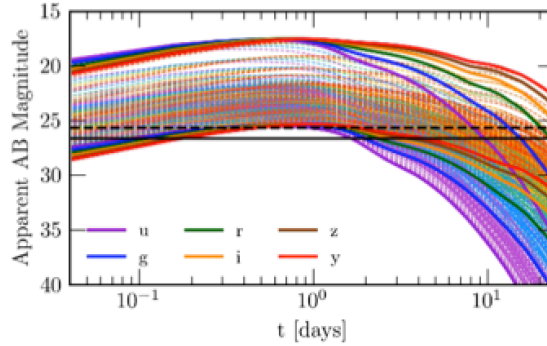
Depending on the satellites, we will have **tens to hundreds** of detections per year

Crucial Instruments able to localize at arcmin-arcsec level to drive multiwavelength and spectroscopic follow-up!

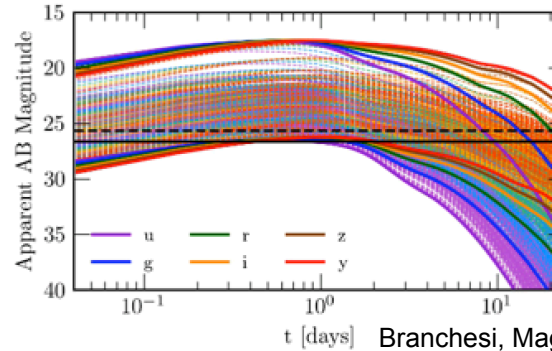
# Kilonova detection



BNSs detected with a sky-localization  $< 40 \text{ deg}^2$

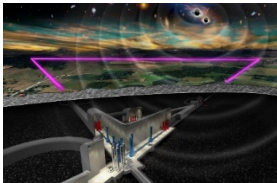


(a)  $\Delta 10 \text{ km HFLF cryo}$



(c) 2L 15 km HFLF cryo

Branchesi, Maggione et al. 2023, A&A



- **Several tens per year** of joint detections of VRO and ET
- **Several hundreds** when ET operates in network of detectors (also current generation ones)