Athena- on ground GW Observing strategy

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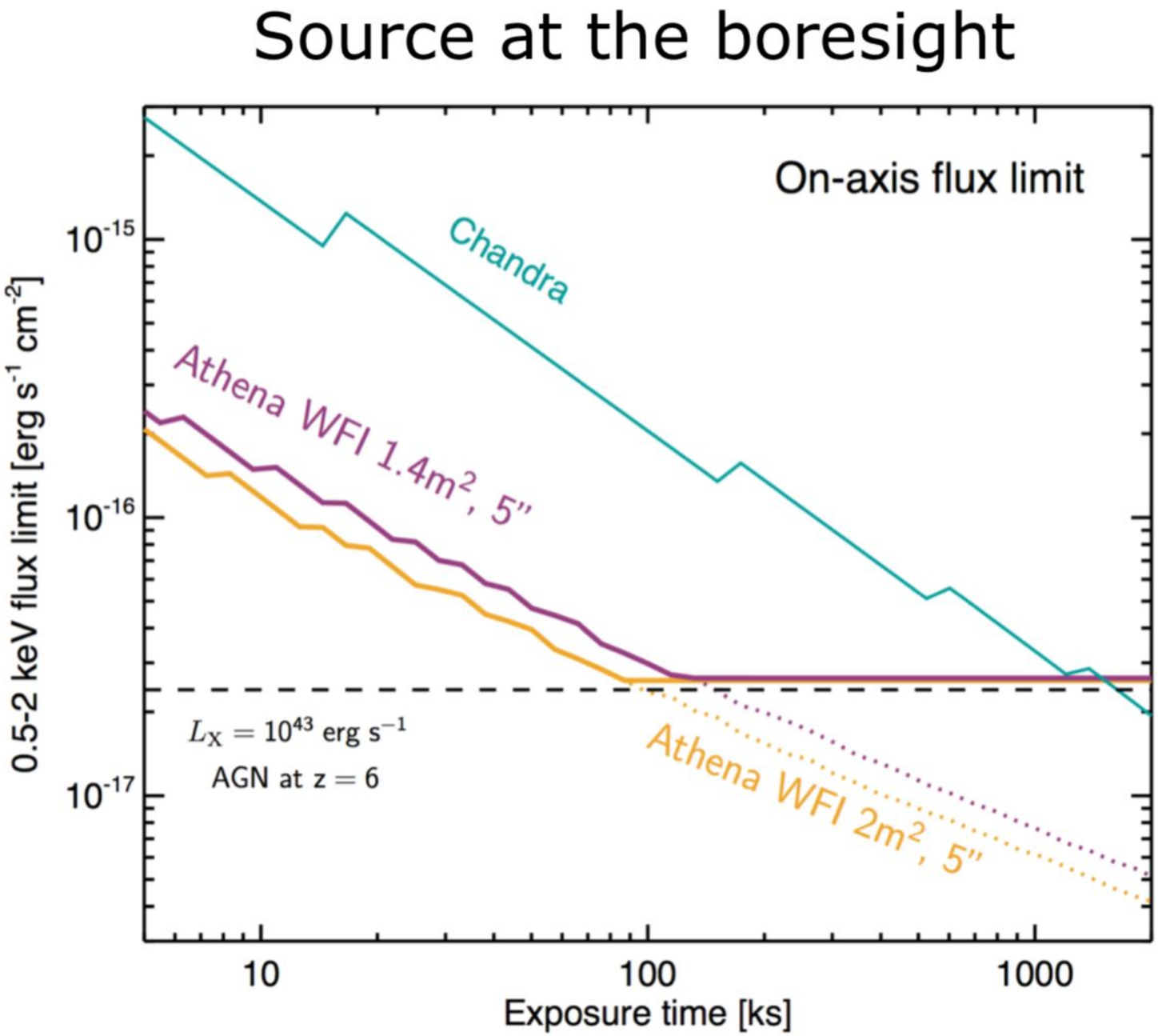
Athena sensitivity

- Localizations < 3 arcmin => XIFU (similar sensitivity as in fig. above)
- For larger errox boxes => WFI (sensitivity averaged over the FOV ~3 times larger)
- Athena counts(phindex=2, NH=3 10^{20}) = 10^{13}*F(0.5-2)*texp
- To get >500 counts (mid quality spectrum): texp> 5 10^{-14}/F(0.5-2) ksec, e.g. 100 ksec for F=5 10^{-16}



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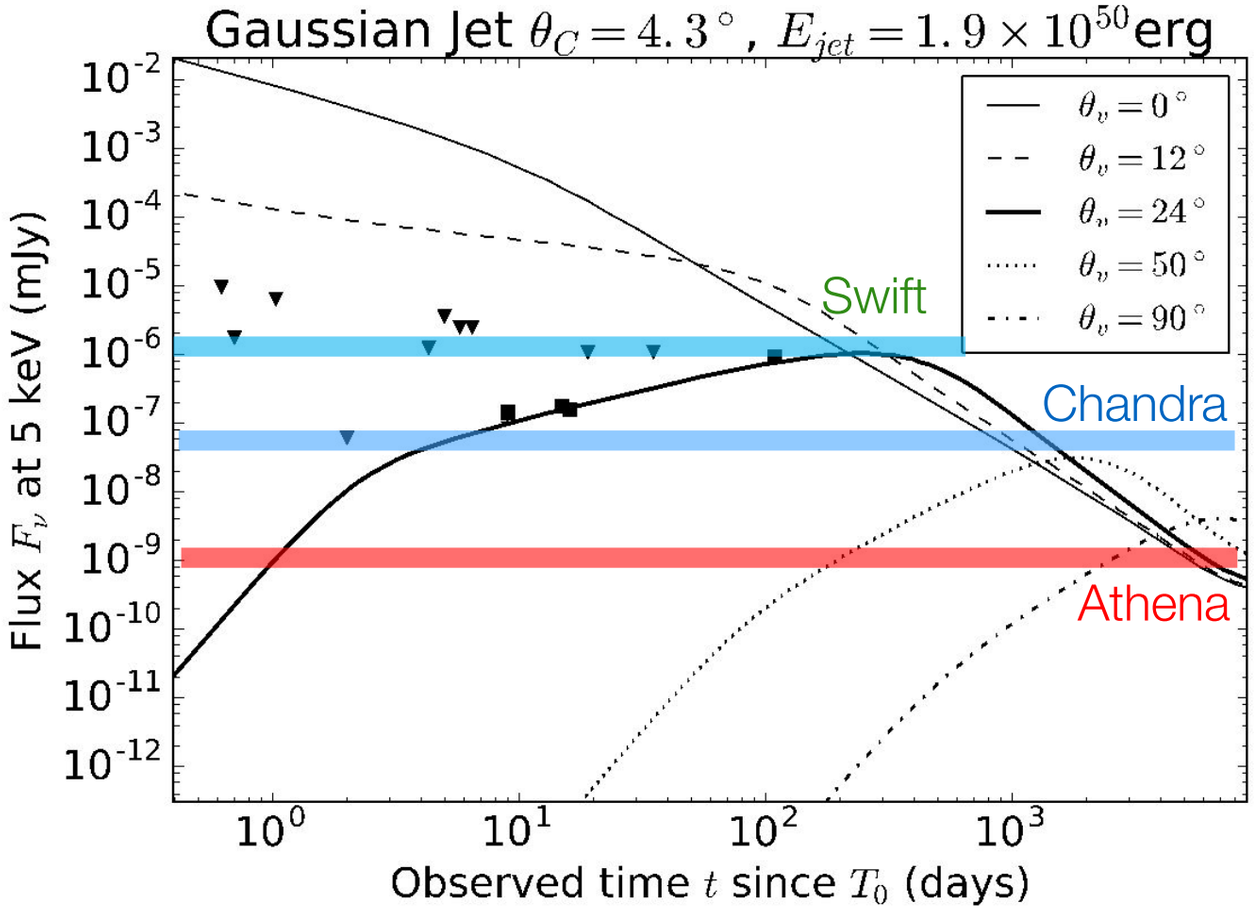
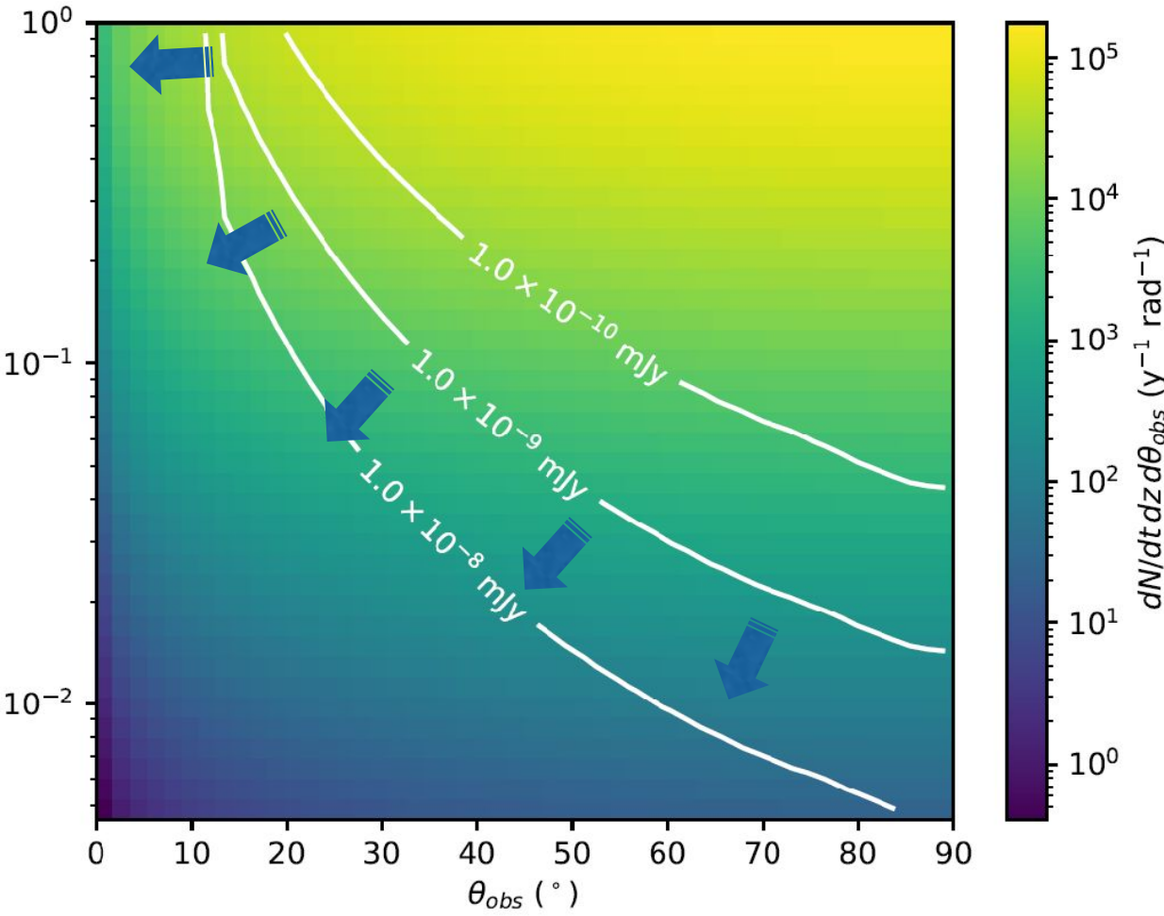
Extending the EM horizon to GW mergers: off-axis jet





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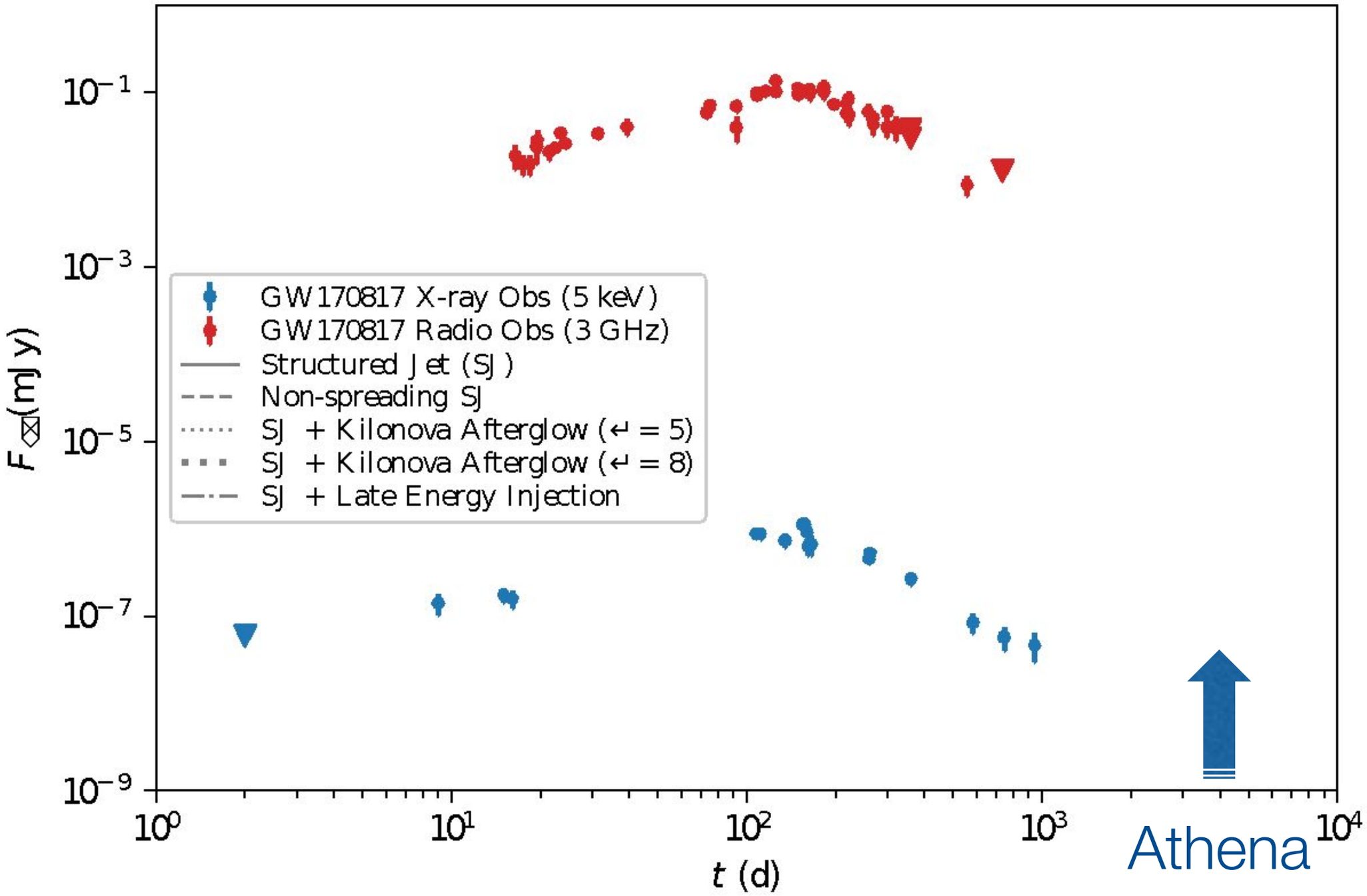
Late time kilonova and magnetar



Exposure times (preliminary)

GW170817	Jet		Late Kilonova		Magnetar		GW170817@ 200Mpc: Jet	Latekilonova/Magnetar
T-t0	F(0.5-2keV) 10^{-16}	Exposure (spectrum) ksec	F(0.5-2keV) 10^{-16}	Exp (spectrum) ksec	F(0.5-2keV) 10^{-16}	Exp for det/spec ksec	Exposure	Exposure (detection)
<10 d	12	40					50(det)	
100 d	80	6					150(spec)	
2.5 yrs	4	120	<2	TBD	<2	TBD	100 (det)	
4 yrs	1	20(det.)	5	100	2	250		100(det)
15 yrs	0.1	100 (UL=0.2)	3	160	3	160		100(det)

Det= exposure for detection
Spec= exposure for 500 cts

Observing Strategy (preliminary)

- Jet evolution
  - Sample of 20 events covering the period from 0 to 2 years after the merger, 5-10 observations each, exp time tailored to distance and delay (work in progress)
- Late-time kilonova/magnetar emission
  - Sample of 20 (TBC) mergers localized in the >2020 by GW+EM, (i.e from 2 to 13 years after merging). About 20 obs, 50-100 ksec each.
- Early kilonova
  - Sample of 5 objects selected to be nearby
  - Define criteria for «fast»assessment of trigger criteria (early warning from ET?)
  - Fast TOOs 20 ksec each (TBC)