First analysis of TAROT observations of GRANDMA

A study using the TAROT data during runs O1, O2, O3

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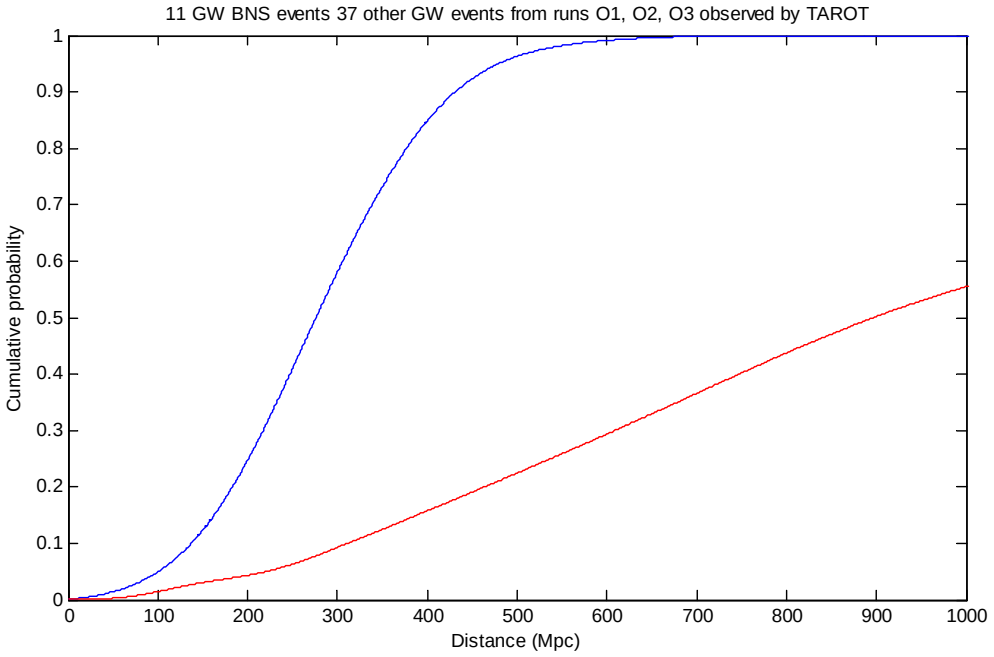
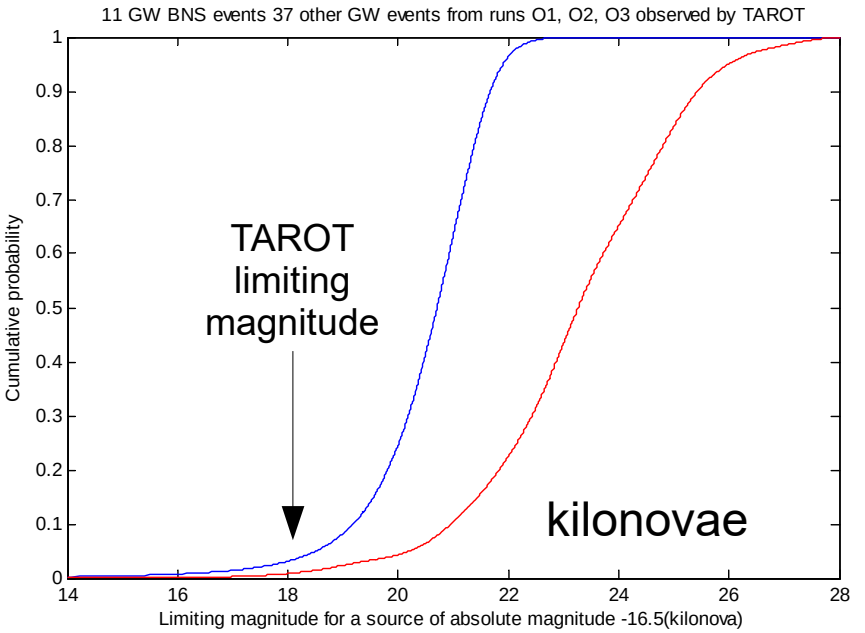
Context of GW alerts
How spread in the sky are the alerts ?

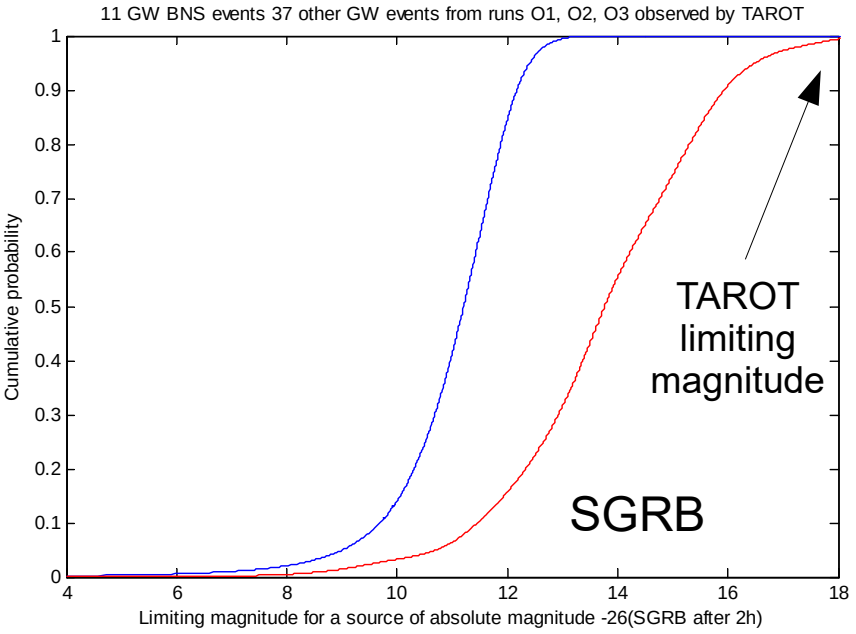
BNS	median value is 4480 deg2 (253 to 24264)
Other than BNS	median value is 921 deg2 (23 to 24220)

Context of GW alerts
How far are located the GW progenitors ?

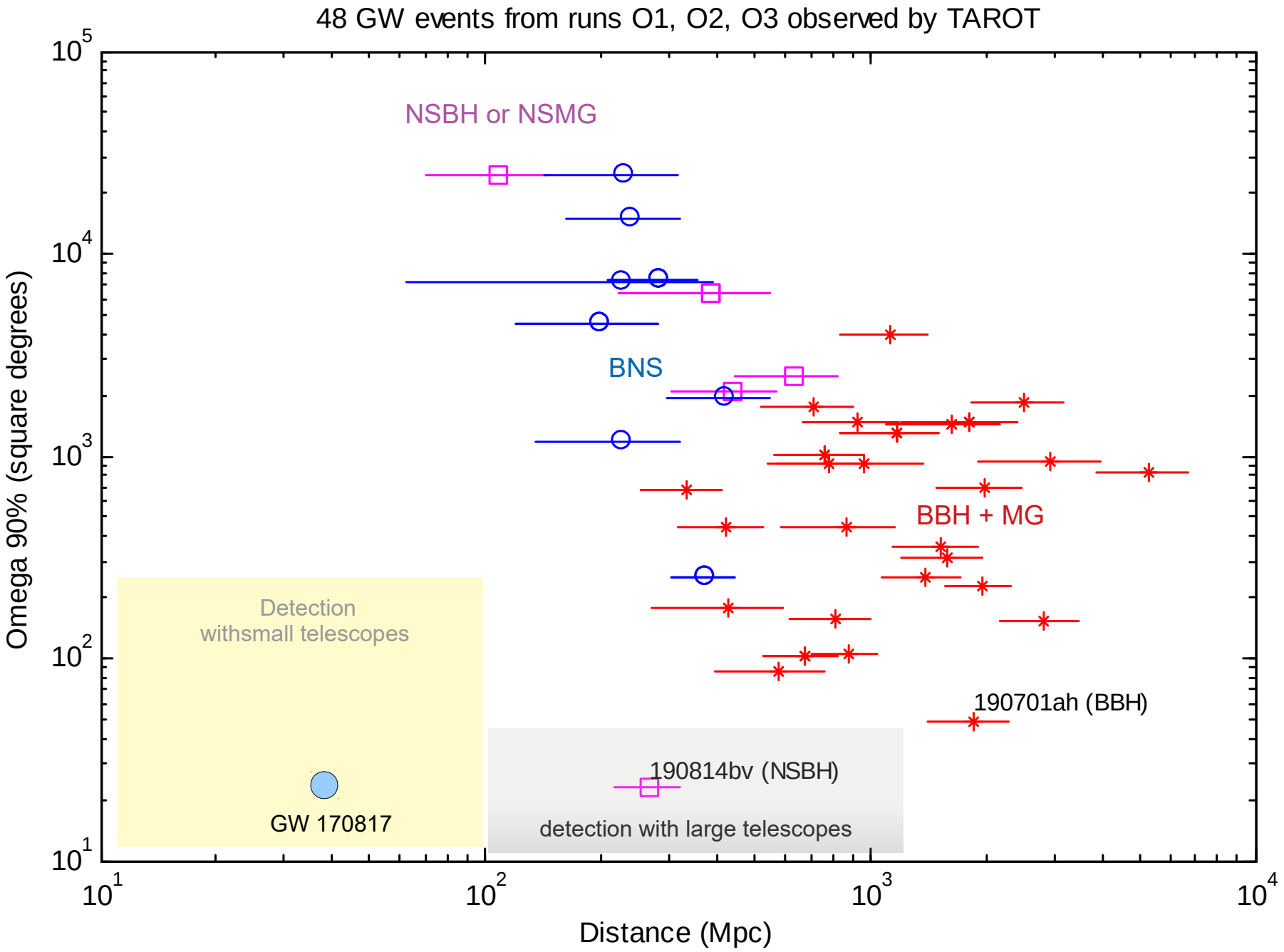
Blue = BNS
Red = other GW alerts



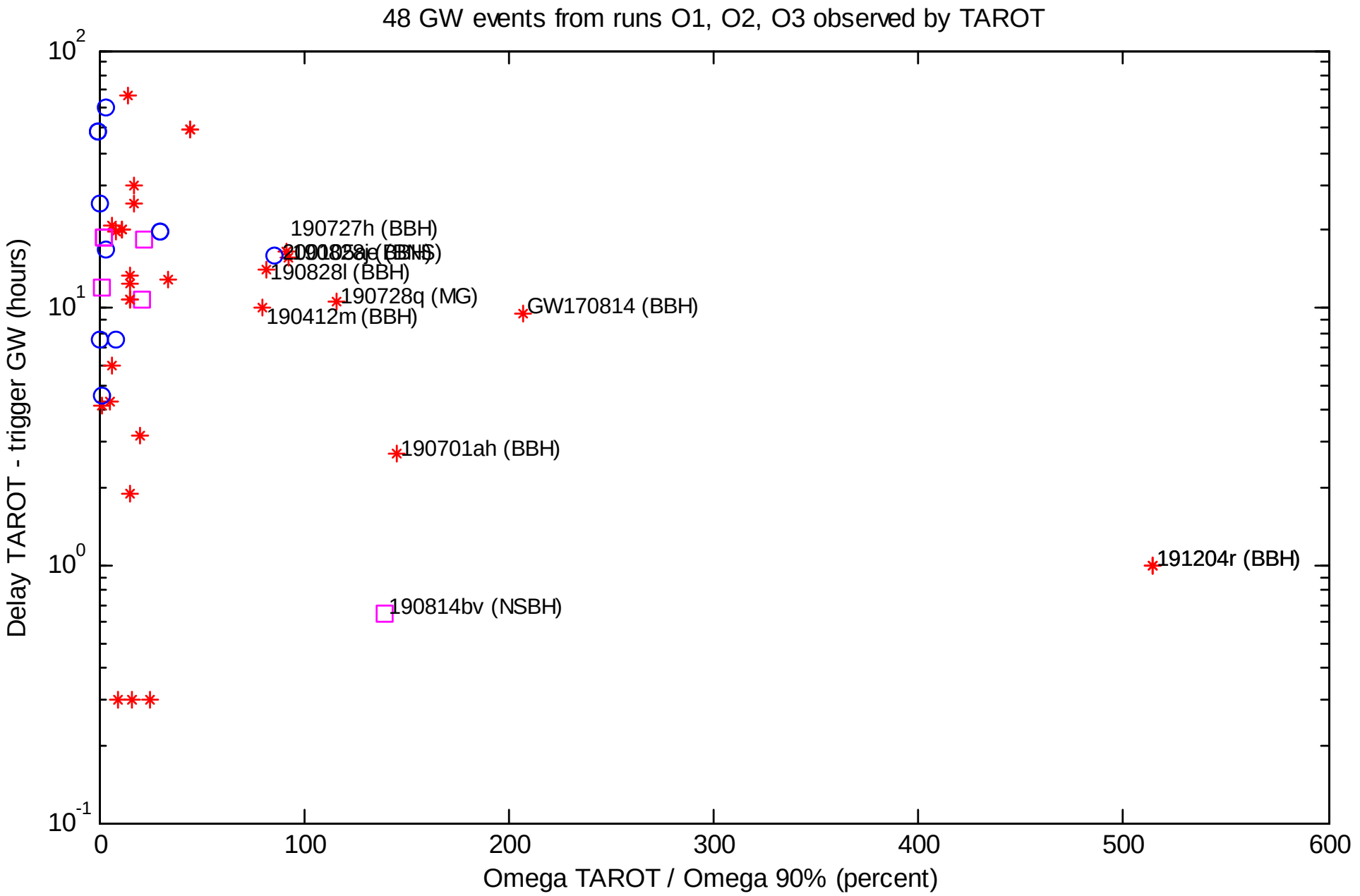




Context of GW alerts
Distance and area of the skymap



Delay and spatial completion of TAROT observations
What are the golden GWs ?



Limits of TAROT observations compared to gravitational energy released
How much part of gravitational energy is emited in optics flux?

Paper of Noysena et al. 2019 ApJ

No detections by TAROTs during the runs O1, O2

GW 170814 a BBH fully covered in 0.6 day by TAROT Reunion

What to do with limiting magnitude of one event ?

$$L = \frac{\alpha \Delta E}{\Delta t} \qquad m_{candidate} = -16.12 - 2.5 log \frac{L}{D^2} \longrightarrow \alpha = 0.32 \cdot \frac{\Delta t_{min} \times D^2_{Mpc} \times 10^{-0.4 \cdot (m_{candidate} + 16.12)}}{\Delta E_{M_\odot}}$$

Alpha can be used to constrain some EM emission models of BBH

Alpha values : GW 170817 gives $2 \cdot 10^{-6}$ (detection of the BNS)
GW 170814 gives $< 1 \cdot 10^{-5}$ (conservative value)

Limits of TAROT observations compared to gravitational energy released

How much part of gravitational energy is emited in optics flux?

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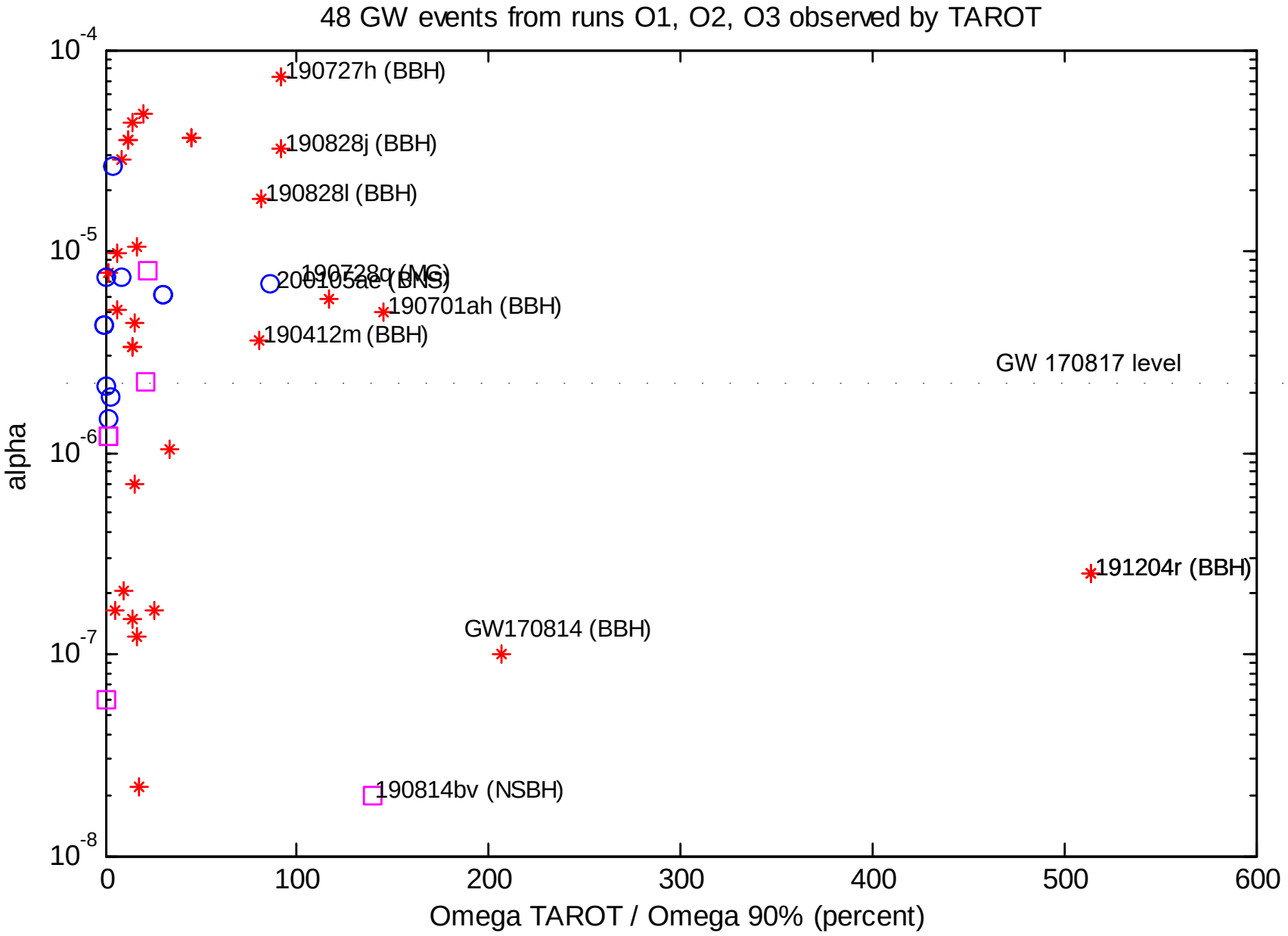

Limits of TAROT observations compared to GRB and kilonovae light curves
What kind of constraints ?

Paper of Noysena et al. 2019 ApJ

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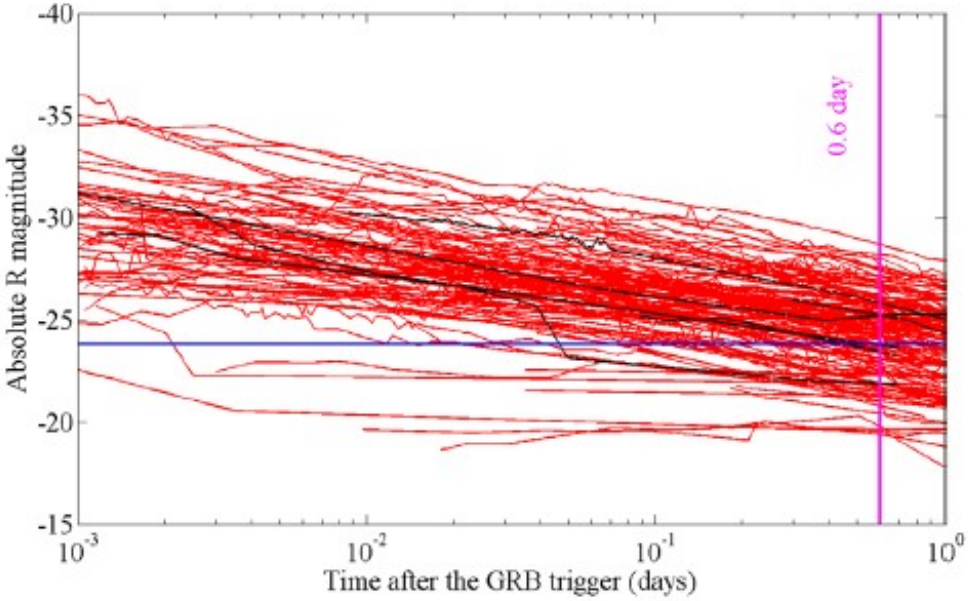

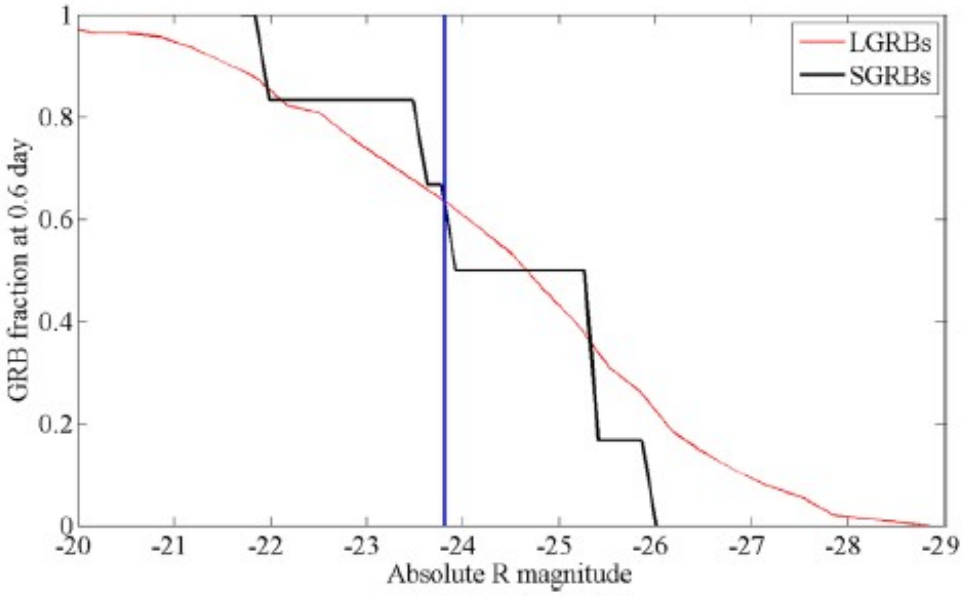

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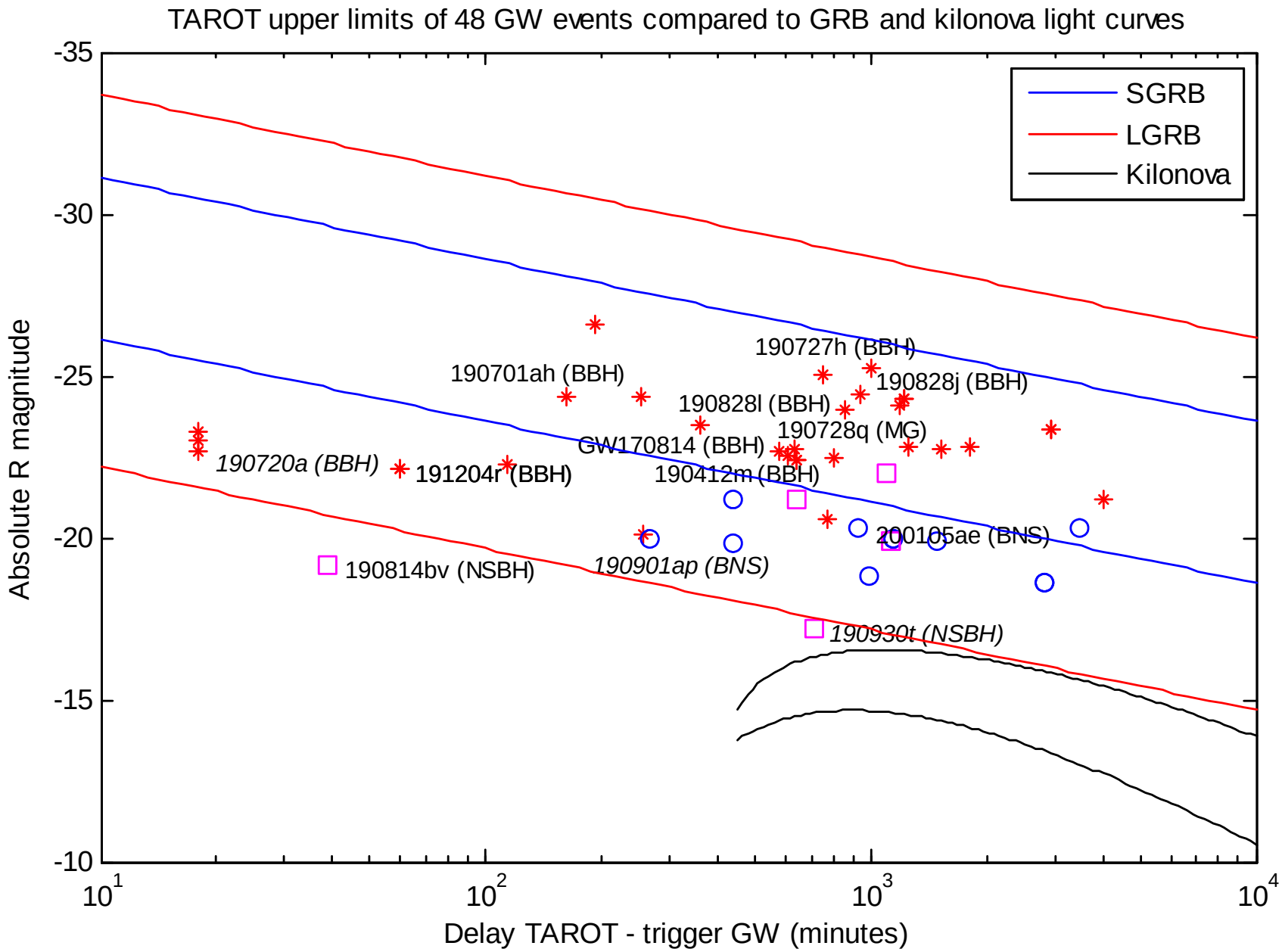

Conclusions about the choice of telescopes
Sizing the next telescope generation

Make a compromise : Diameter, FoV, camera, exposure time, price