

Short GRBs: rare and luminous

The intrinsic properties of the Short GRB population

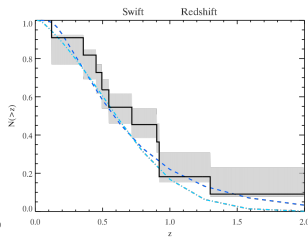
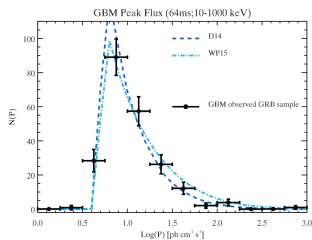
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EWASS – S11 – June 27, 2017

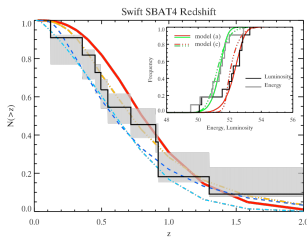
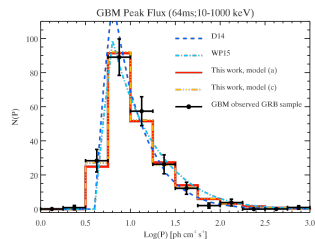


SGRB population properties: fitting all observables

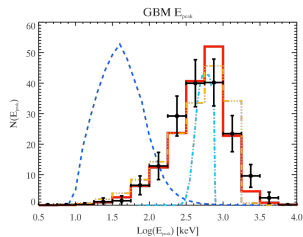
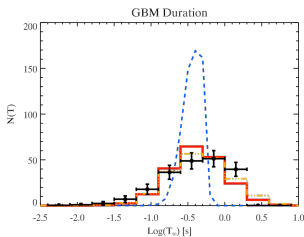
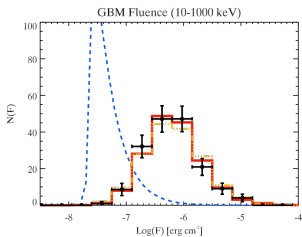


[Guetta+05,06]
 [D'Avanzo+14]
 [Wanderman+15]
Peak flux + Redshift

SGRB population properties: fitting all observables

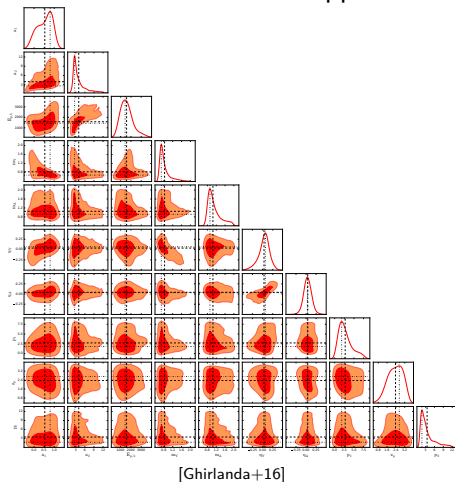


[Guetta+05,06]
 [D'Avanzo+14]
 [Wanderman+15]
Peak flux + Redshift
 [Ghirlanda+16]
All constraints

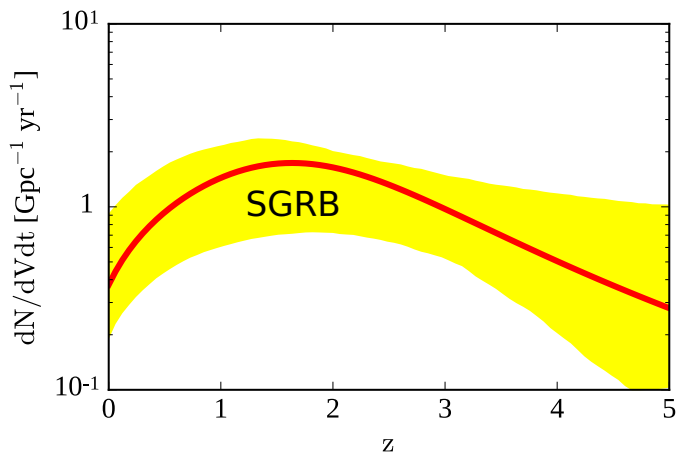


SGRB population properties: fitting all observables

Find most likely intrinsic parameters that reproduce the observed distributions: MCMC approach

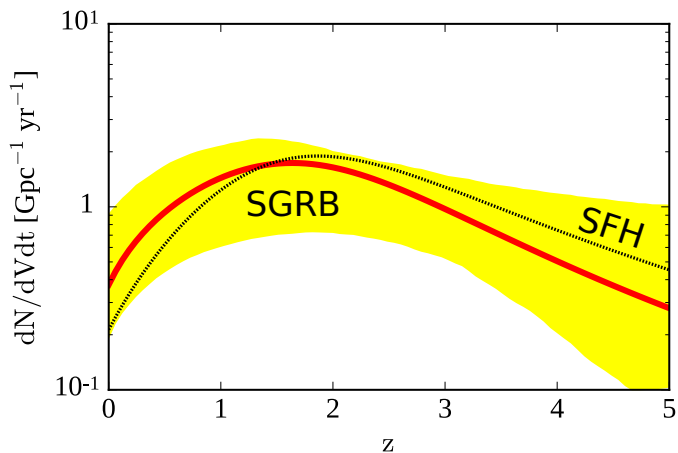


SGRB redshift distribution



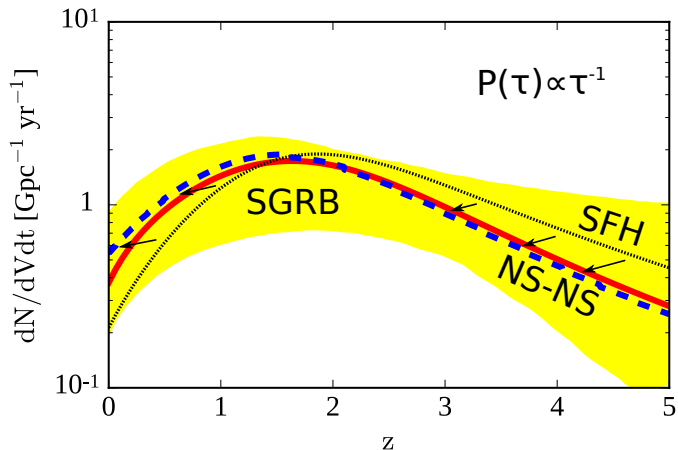
[data from Ghirlanda+16]

SGRB redshift distribution



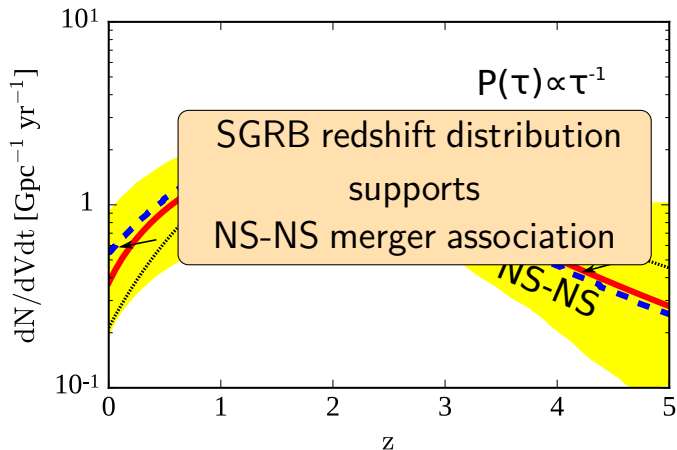
[data from Ghirlanda+16]

SGRB redshift distribution



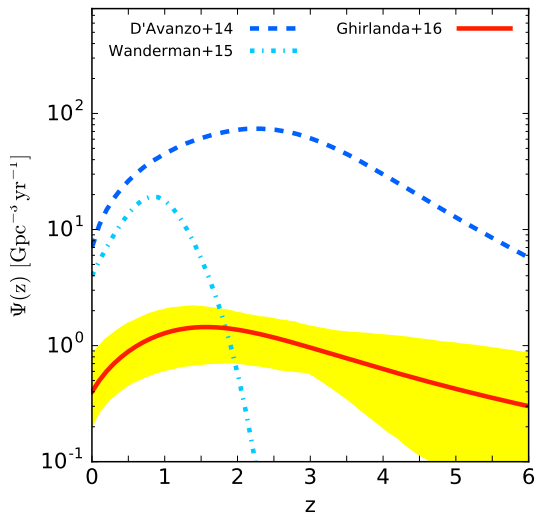
[data from Ghirlanda+16]

SGRB redshift distribution

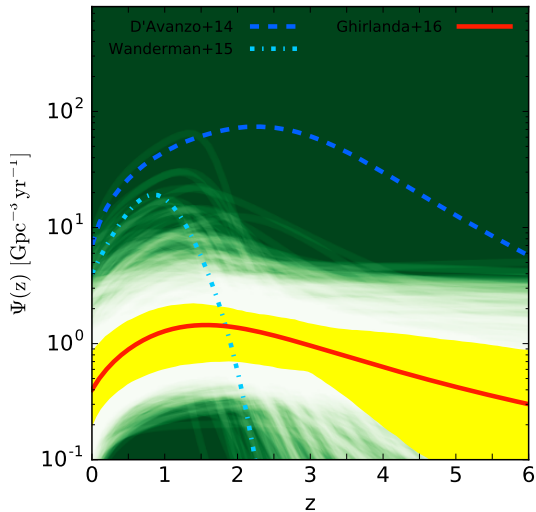


[data from Ghirlanda+16]

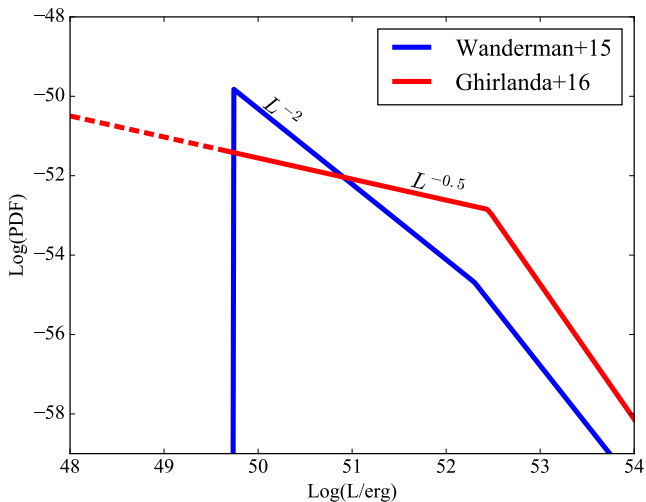
SGRB redshift distribution (comparison w. previous works)



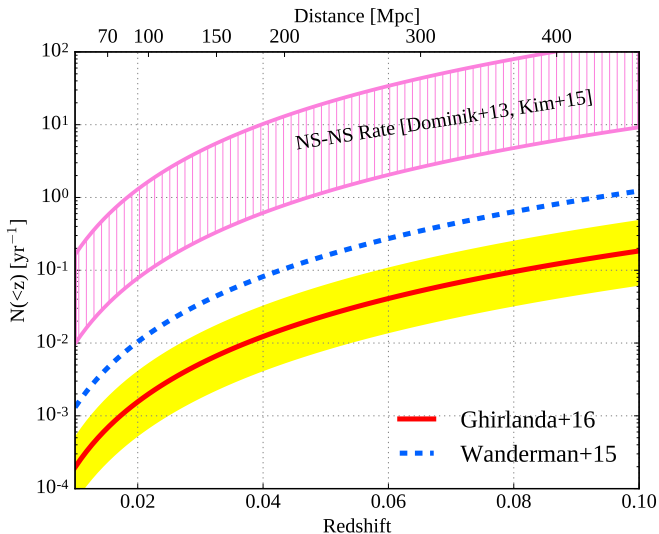
SGRB redshift distribution (comparison w. previous works)



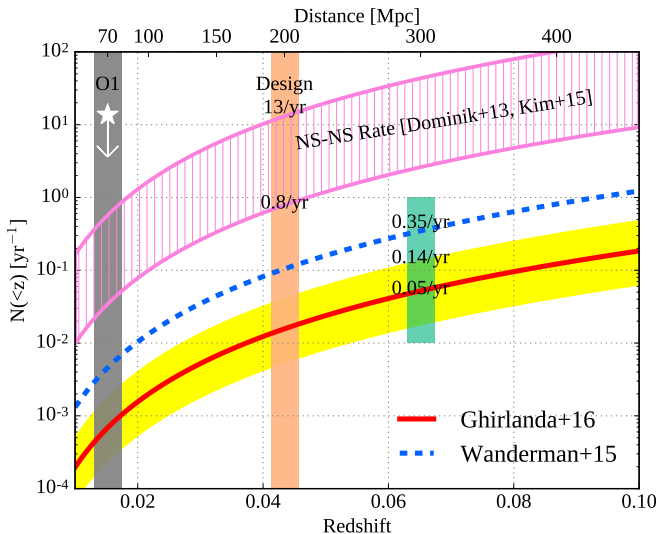
SGRB Luminosity Function



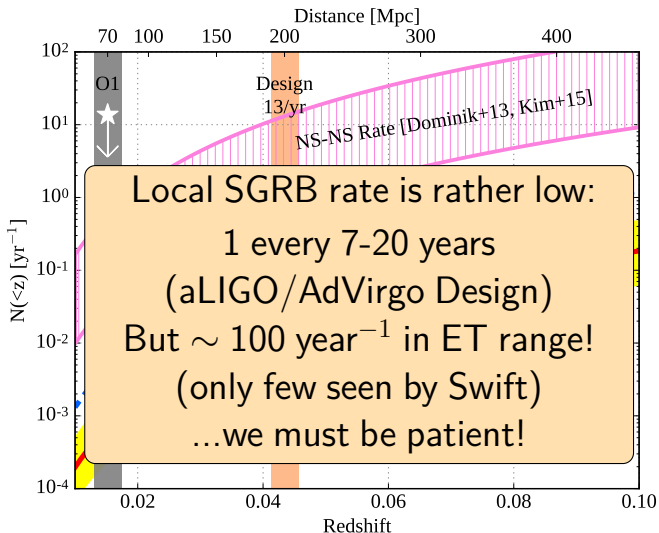
SGRB local event rate



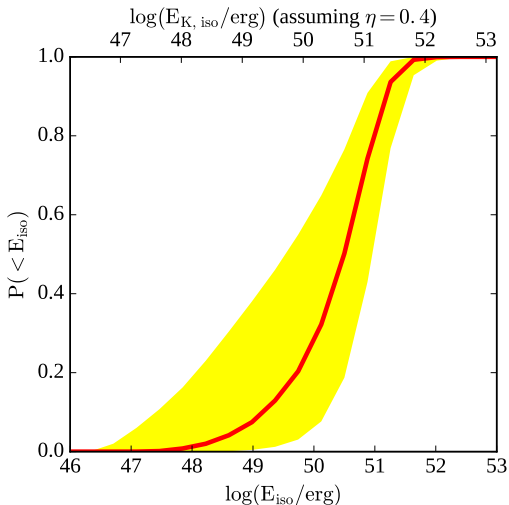
SGRB local event rate



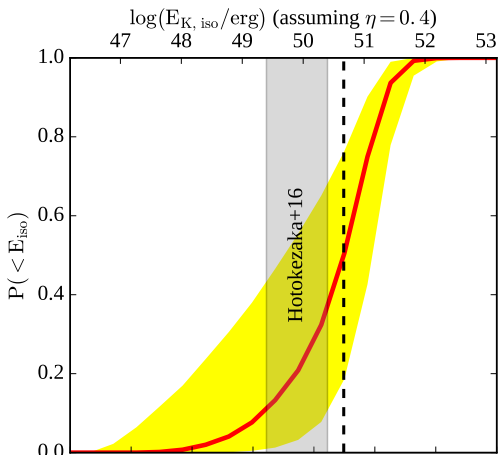
SGRB local event rate



SGRB energy distribution

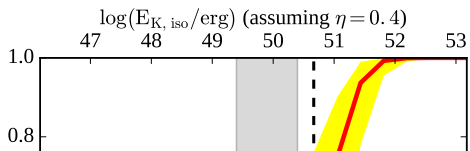


SGRB energy distribution

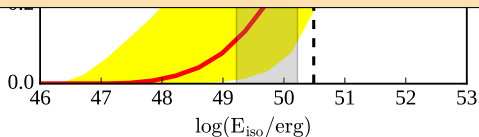


Hotokezaka+16: predictions about Radio orphan afterglows detectability (as EM counterparts of NS-NS mergers)

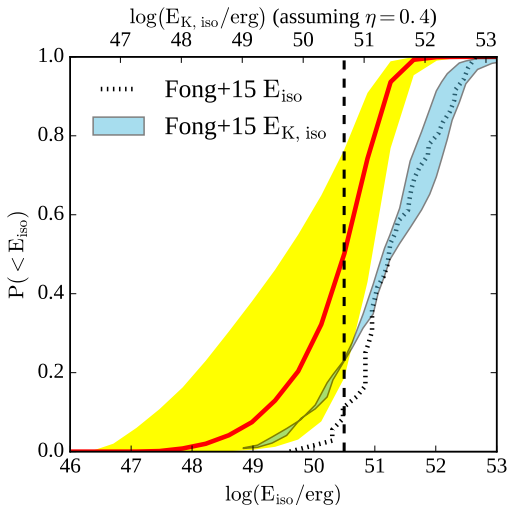
SGRB energy distribution



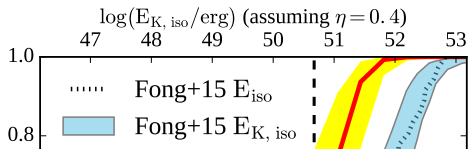
Better prospects for (orphan)
afterglows!
(we're working out the expected rate
for various surveys)



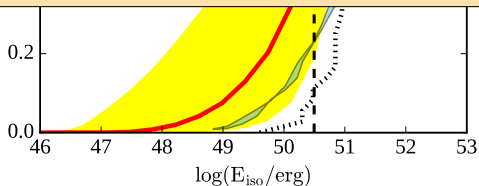
SGRB energy distribution



SGRB energy distribution



Still
 afterglows are intrinsically dimmer than
 observed on average



Concluding remarks

- Accurate reconstruction of intrinsic population properties of SGRBs requires *all* observables
- Intrinsic redshift distribution of SGRBs supports SGRB-compact binary merger association
- The intrinsic rate of SGRBs is $50 \div 500$ times lower than Dominik+13 NS-NS rate (this accounts for beaming factor & “jettiness” – jet launching efficiency). Not very encouraging for SGRB-GW association.
- Intrinsic energy distribution of SGRBs: larger average energy than previously thought, but still most jets are weaker than the observed population: need deep EM follow-up for (orphan) afterglow detection!

THANK YOU!