

鏡の変更に伴う 超新星爆発からの重力波検出への影響



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- Abdikamalov2010
"Axisymmetric general relativistic simulations of the accretion-induced collapse of white dwarfs"
Abdikamalov, E. B.; Ott, C. D.; Rezzolla, L.; Dessart, L.; Dimmelmeier, H.; Marek, A.; Janka, H.-T.
PhysRevD.81.044012
<http://adsabs.harvard.edu/abs/2010PhRvD..81d4012A>

 - Chimera
"Gravitational Waves from Core Collapse Supernovae"
Konstantin N Yakunin, Pedro Marronetti, Anthony Mezzacappa, Stephen W Bruenn, Ching-Tsai Lee, Merek A Chertkow, W Raphael Hix, John M Blondin, Eric J Lentz, O E Bronson Messer, Shin'ichiro Yoshida
(Oak Ridge National Lab / Florida Atlantic University Chimera Collaboration)
Class.Quant.Grav.27:194005,2010
<http://arxiv.org/abs/1005.0779>

 - signal_dataDim2008
"The gravitational wave burst signal from core collapse of rotating stars"
Dimmelmeier, H., Ott, C.D., Marek, A., and Janka, H.-T.
Phys. Rev. D, 78, 064056, (2008)
<http://arxiv.org/abs/0806.4953>

 - signal_dataDim2007
"Generic gravitational wave signals from the collapse of rotating stellar cores",
Dimmelmeier, H., Ott, C.D., Janka, H.-T., Marek, A., and Müller, E.,
Phys. Rev. Lett., 98, 251101, (2007),
<http://arxiv.org/abs/astro-ph/0702305/>

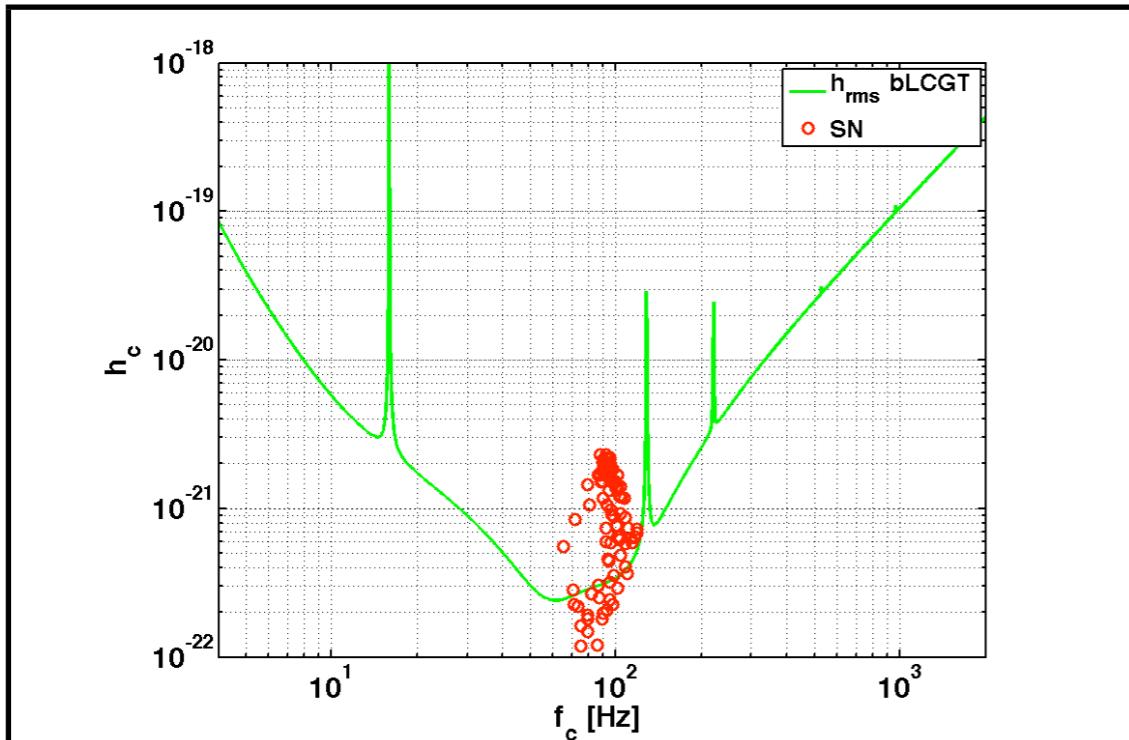
 - SignalsDim2001
"Relativistic simulations of rotational core collapse. II. Collapse dynamics and gravitational radiation"
Dimmelmeier, H., Font, J.A., and Müller, E.,
Astron. Astrophys., 393, 523-542, (2002),
<http://arxiv.org/abs/astro-ph/0204289/>

 - burrows2007
"Features of the Acoustic Mechanism of Core-Collapse Supernova Explosions"
Burrows, A.; Livne, E.; Dessart, L.; Ott, C. D.; Murphy, J.
ApJ 655 416 (2007)
<http://arxiv.org/abs/astro-ph/0610175>

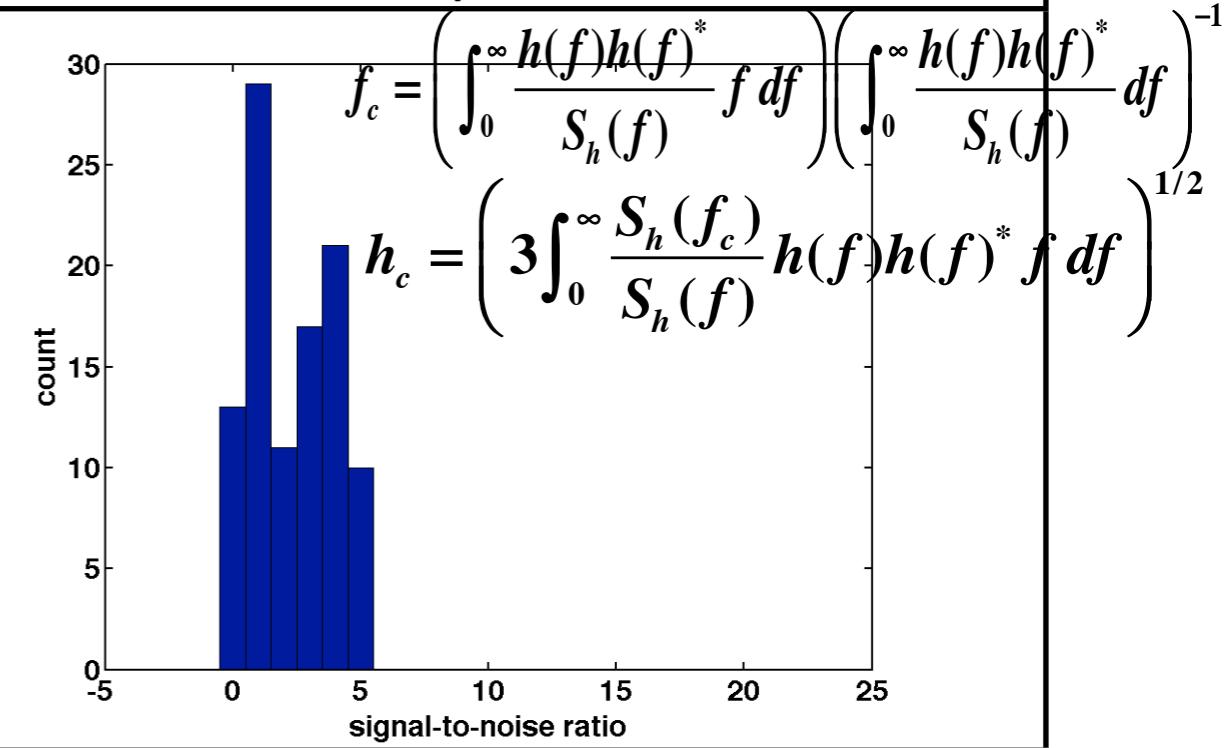
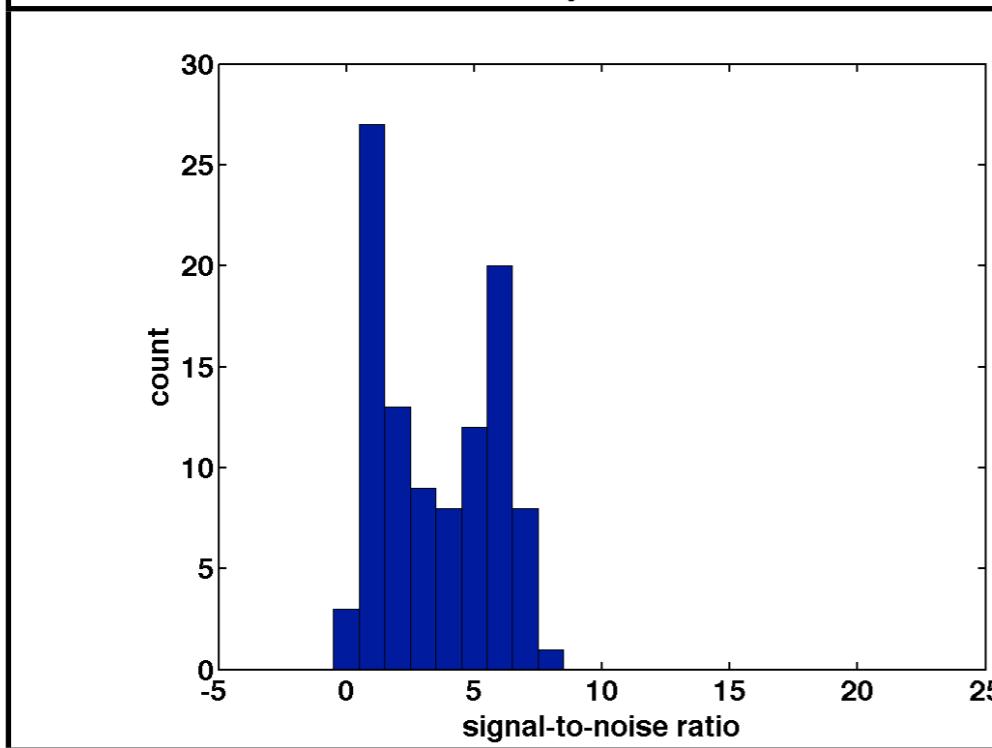
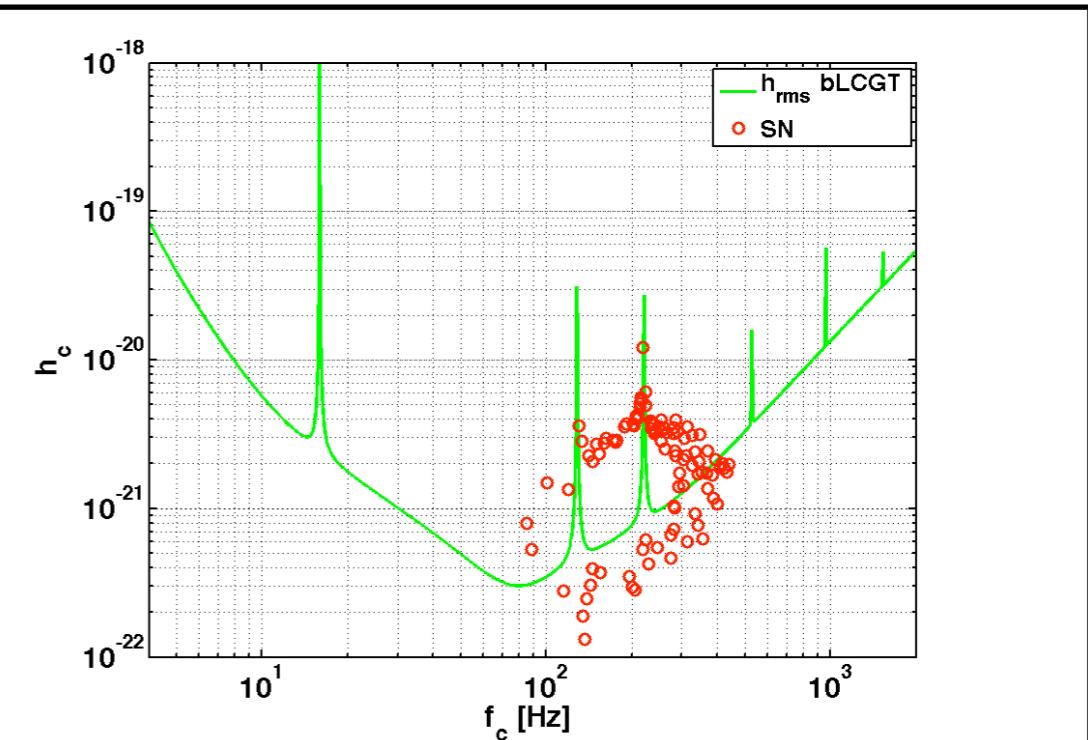
- chimera
 - progenitorが12-25Moの軸対称core collapseモデル
 - contain essential physics(multi-frequency neutrino transport, general relativity)
波形のタイムスケール、振幅が正確に求まる。
- Abdikamalov2010
 - 白色矮星のAccretion-induced collapse(AIC)モデル
- signal_dataDim2008
 - 軸対称の、回転しているcore collapseモデル
 - fully general relativistic hydrodynamic equationsを解く
 - EoSとして、硬めのShenモデルと柔らかめのLattimer&Swestyモデルを使った。
 - いくつかの presupernova stellar model
- signal_dataDim2007
 - 軸対称の、回転しているcore collapseモデル
 - fully general relativistic hydrodynamic equationsを解く
 - EoSとして、硬めのShenモデル
 - presupernova stellar model s20 [Woosley, et al., 2002]
- SignalsDim2001
 - 軸対称の、回転しているcore collapseモデル
 - fully general relativistic hydrodynamic equationsを解く
 - rotating 4/3-polytropes in equilibrium
- burrows2007
 - Acoustic mechanism
 - Standing-Accretion-Shock-Instability (SASI), g-modesなど。

● 20K25W: 35 in 101 models are snr>5, 23K75W: 4 in 101

20K25W



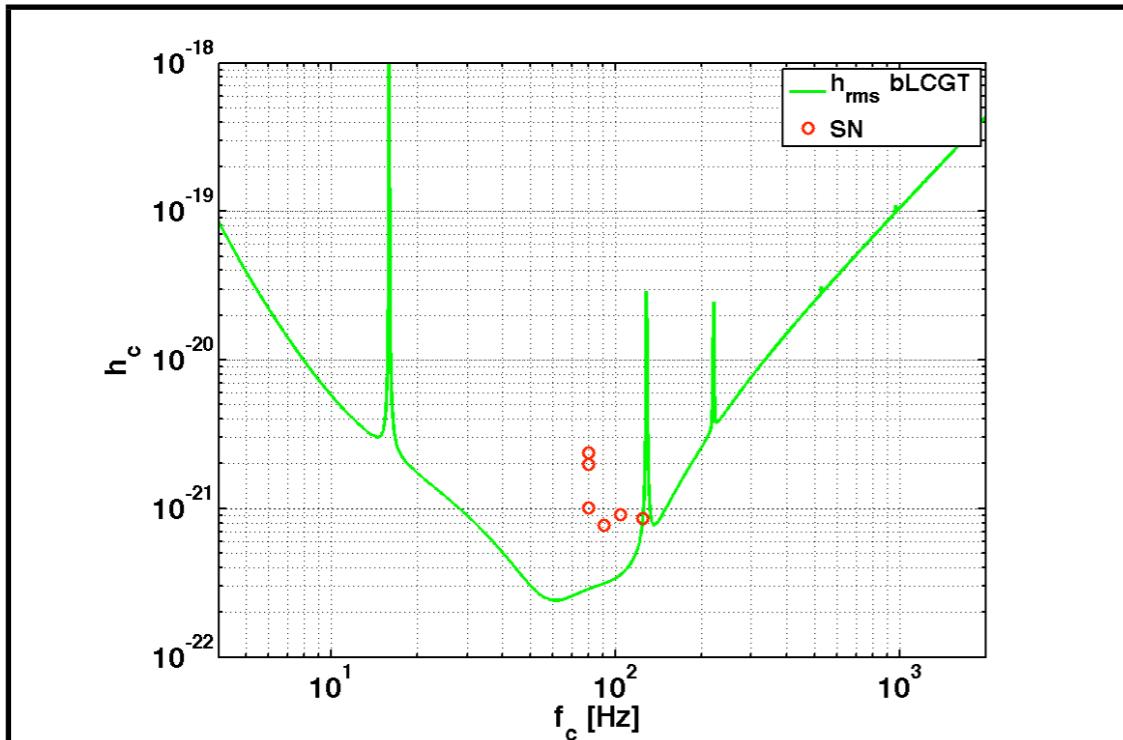
23K75W



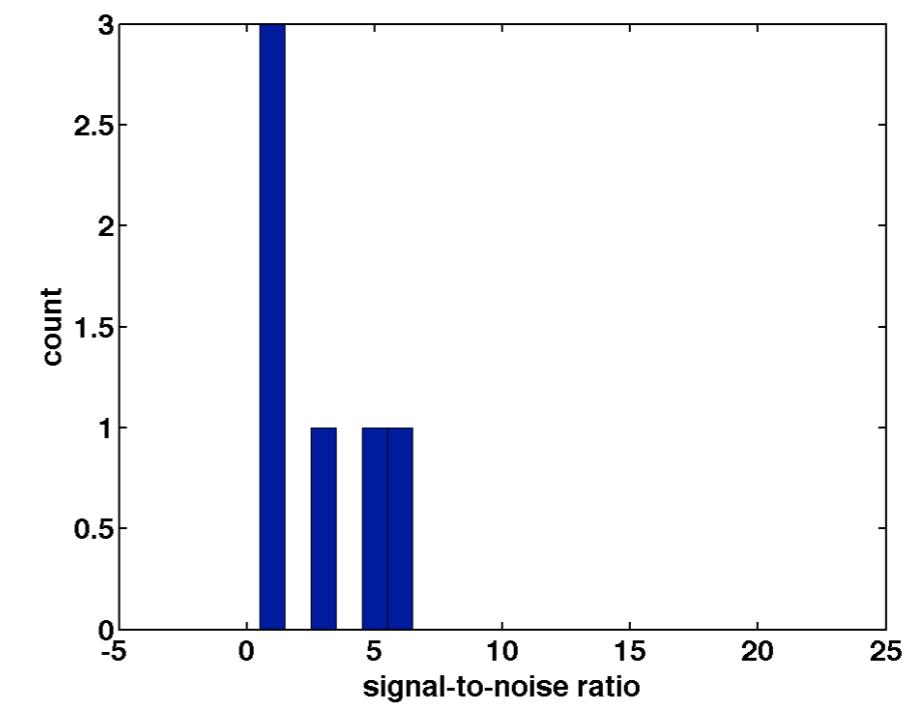
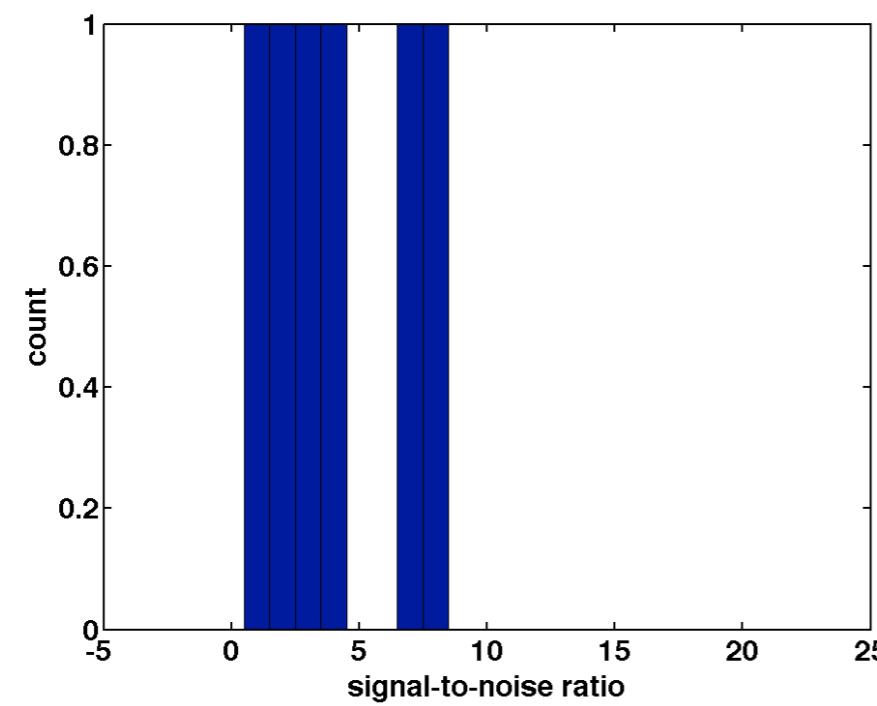
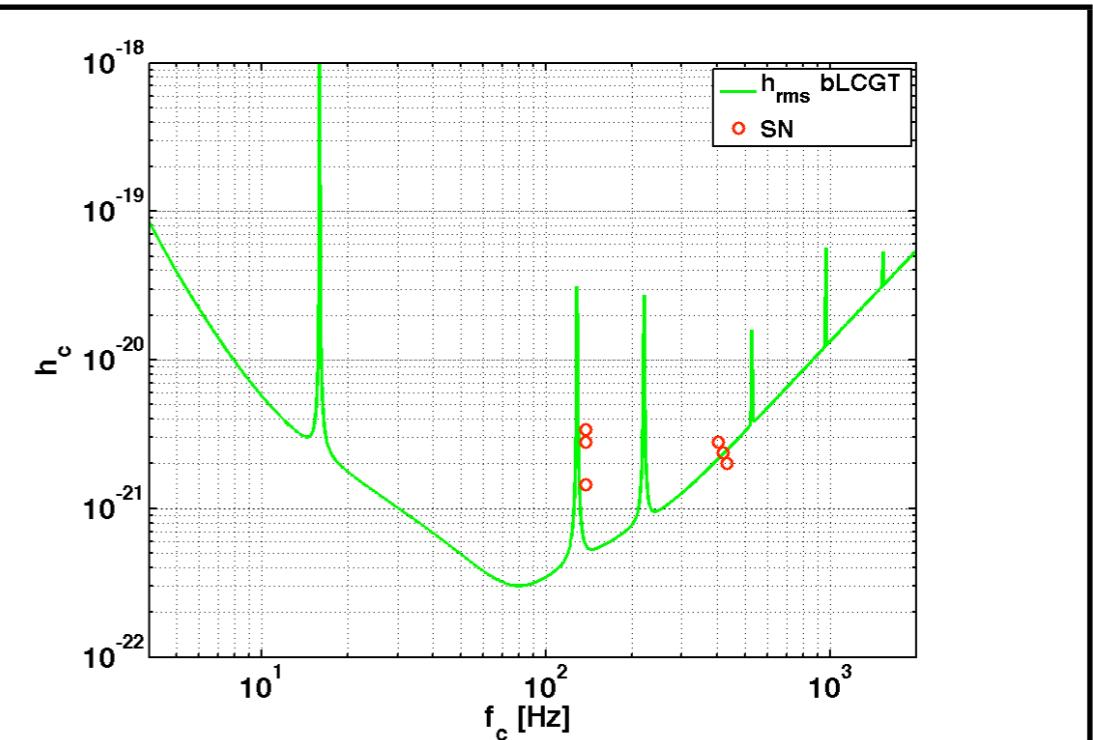


20K25W: 2 in 6 models are snr>5, 23K75W: 2 in 6

20K25W

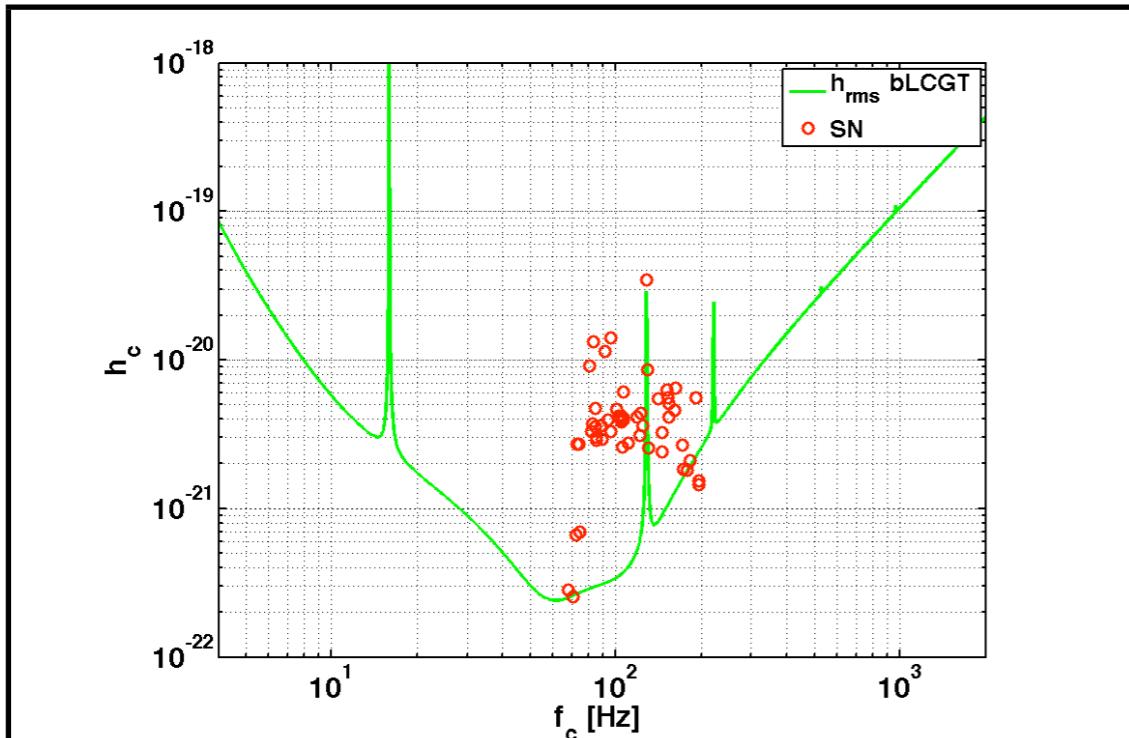


23K75W

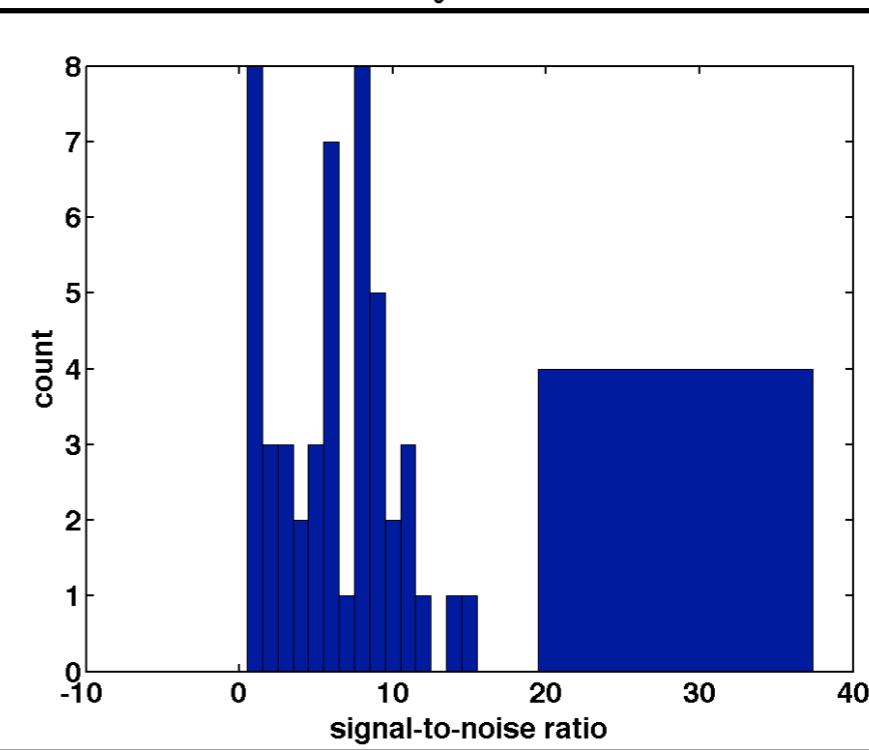
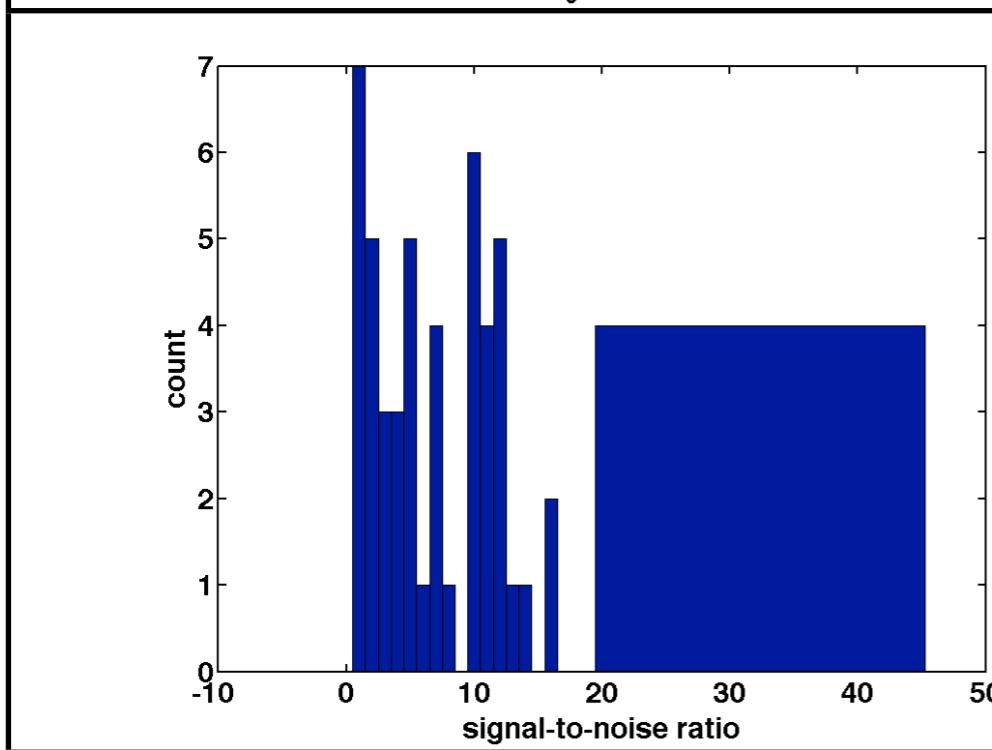
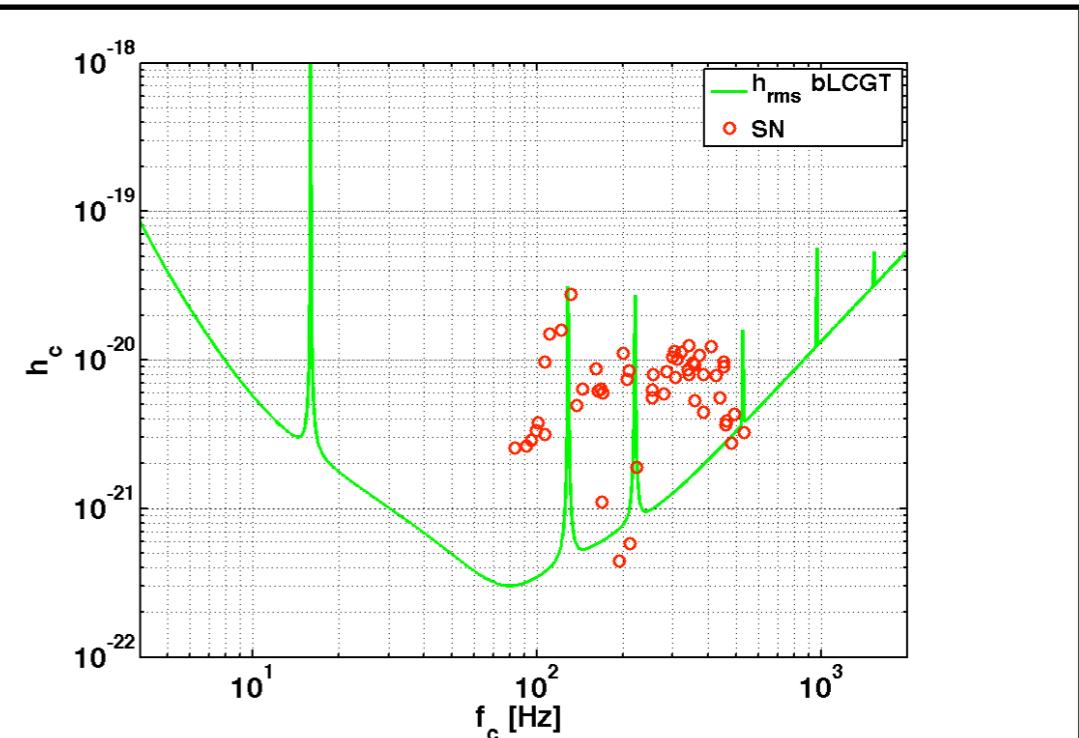


● 20K25W: 31 in 52 models are snr>5, 23K75W: 36 in 52

20K25W



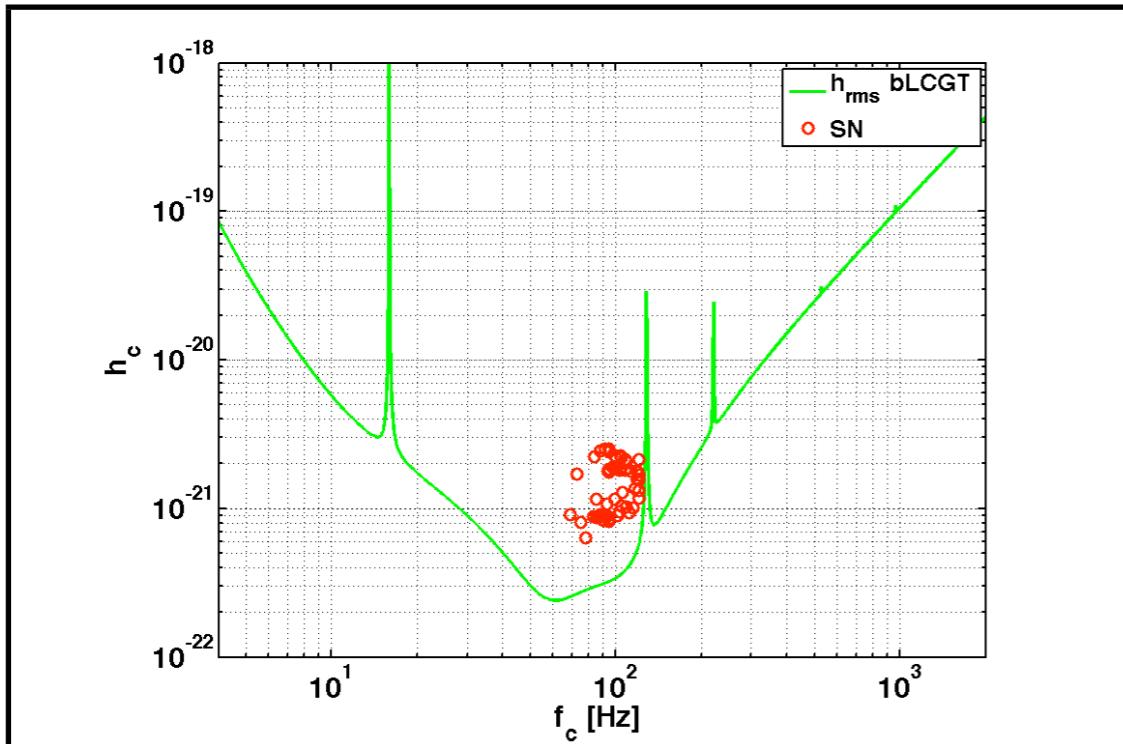
23K75W



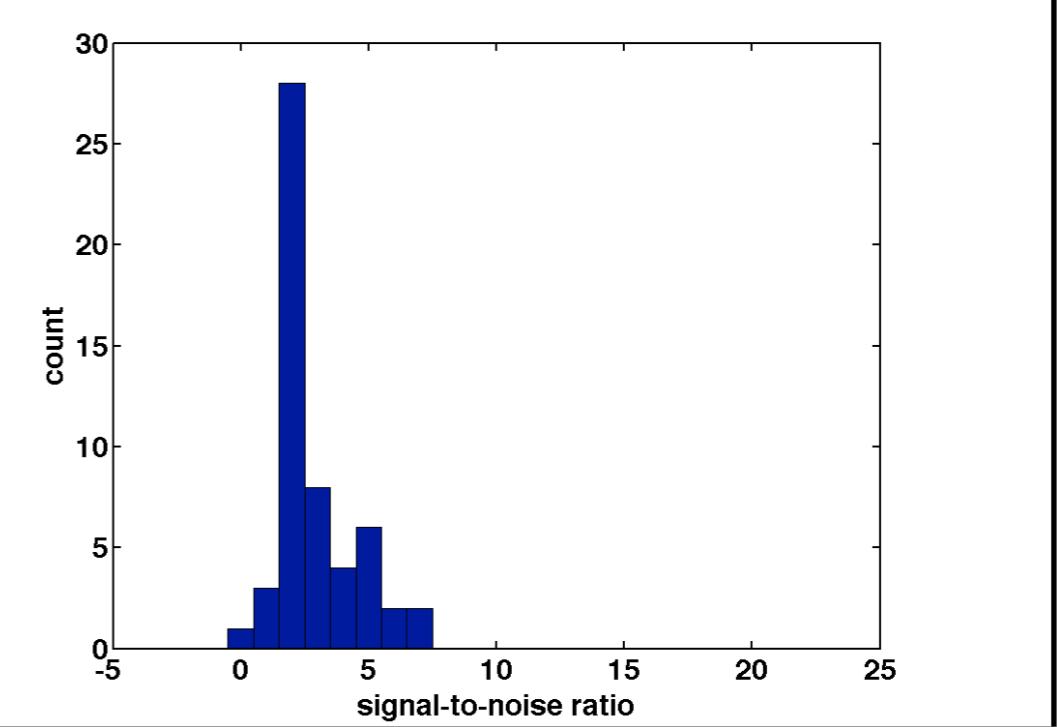
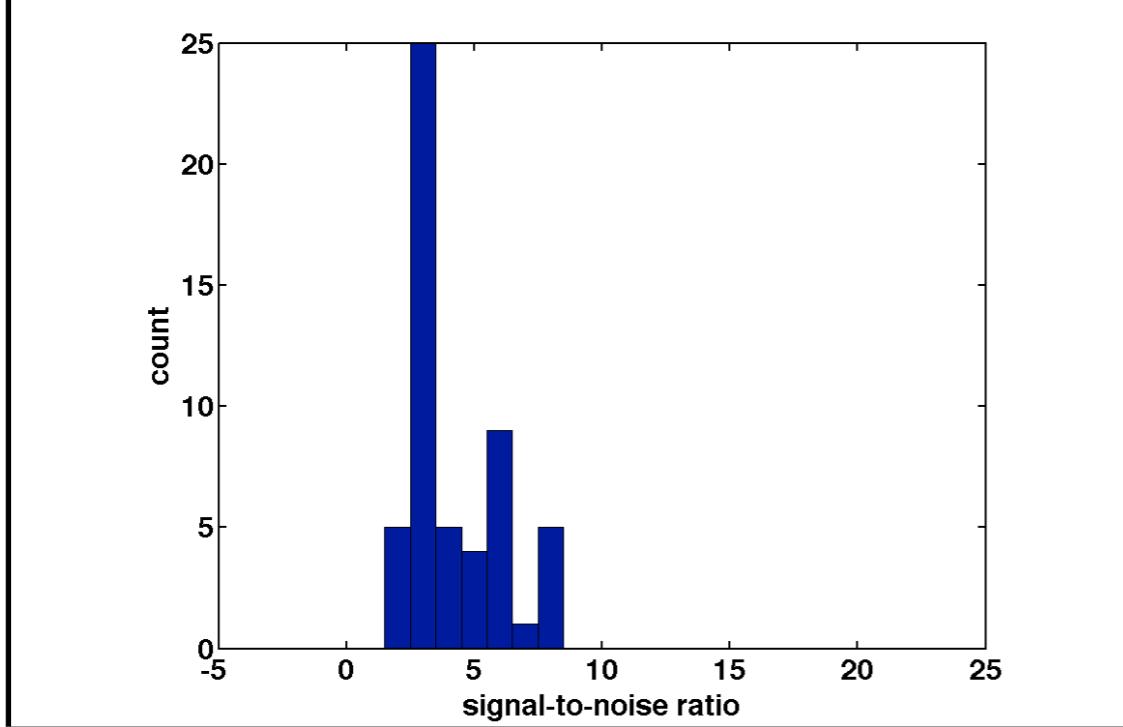
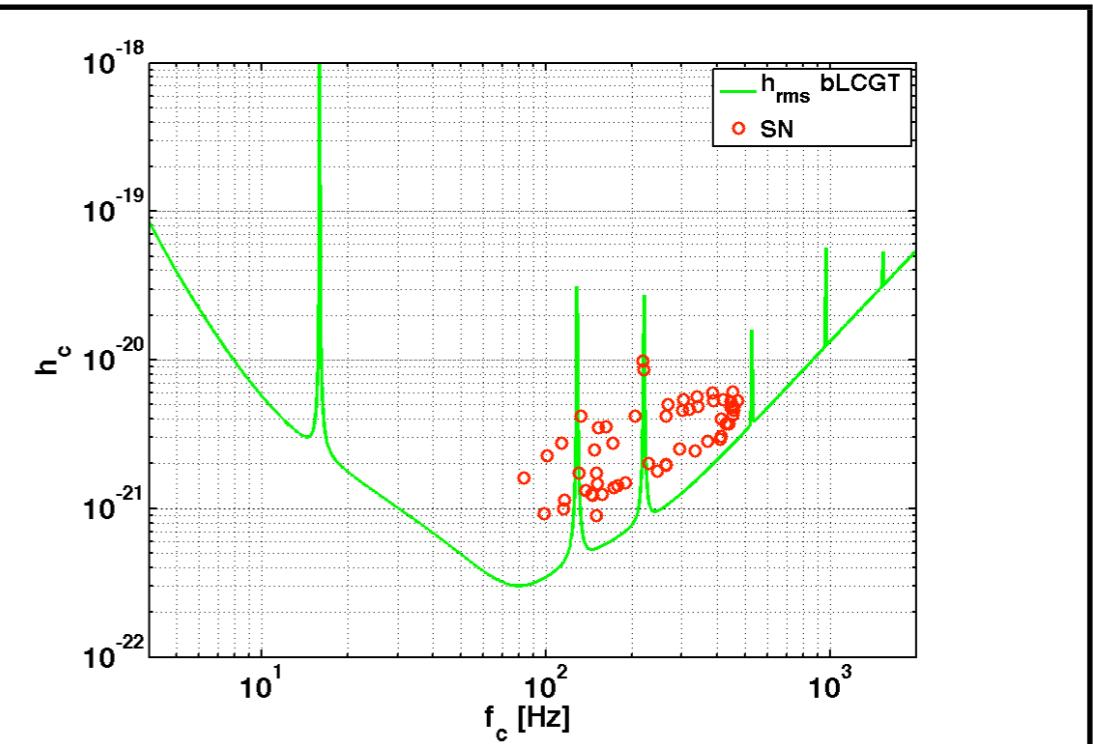


20K25W: 18 in 54 models are snr>5, 23K75W: 7 in 54

20K25W

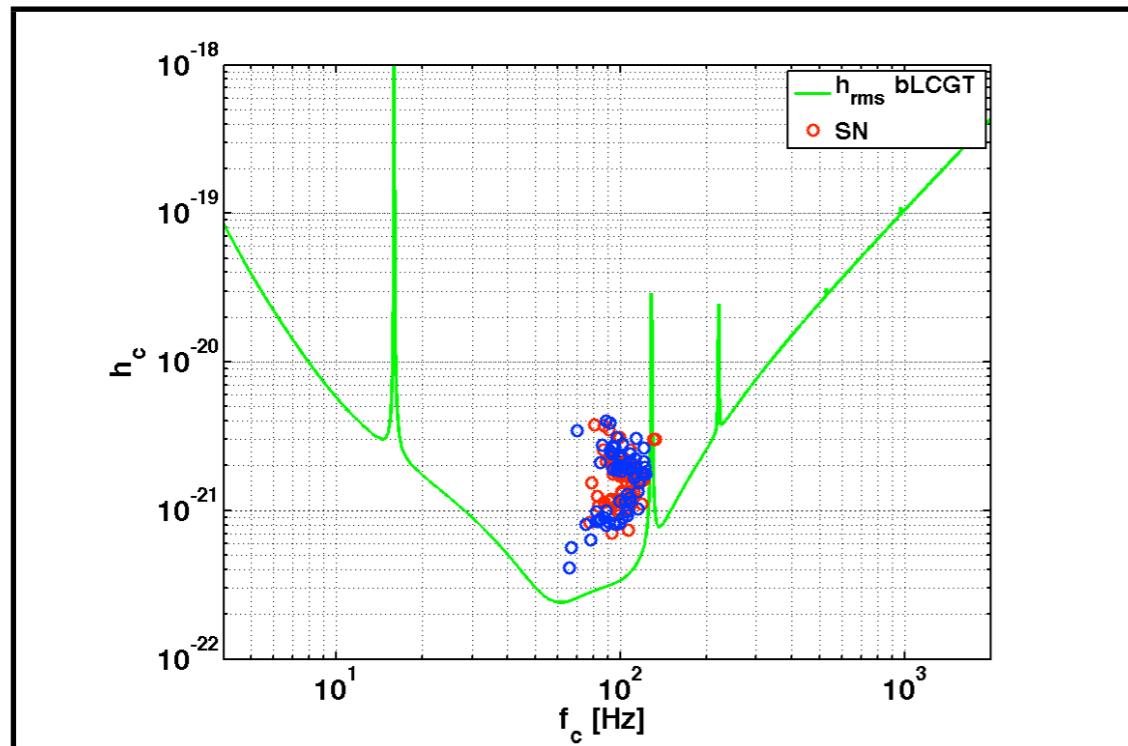


23K75W

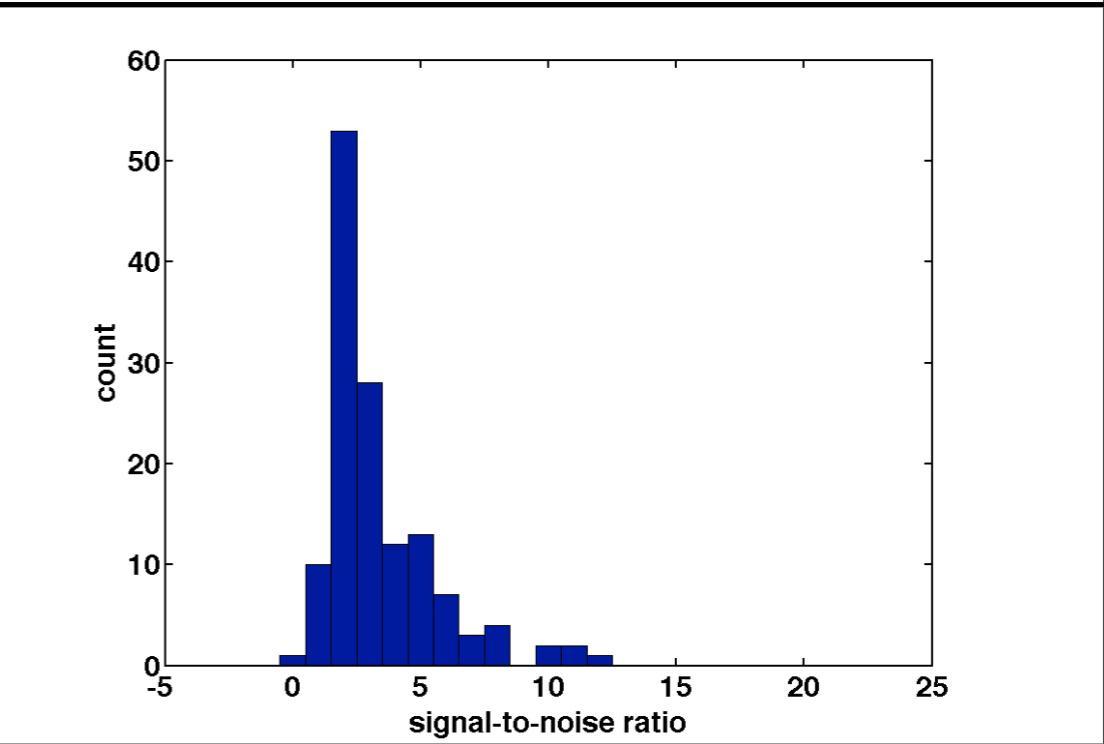
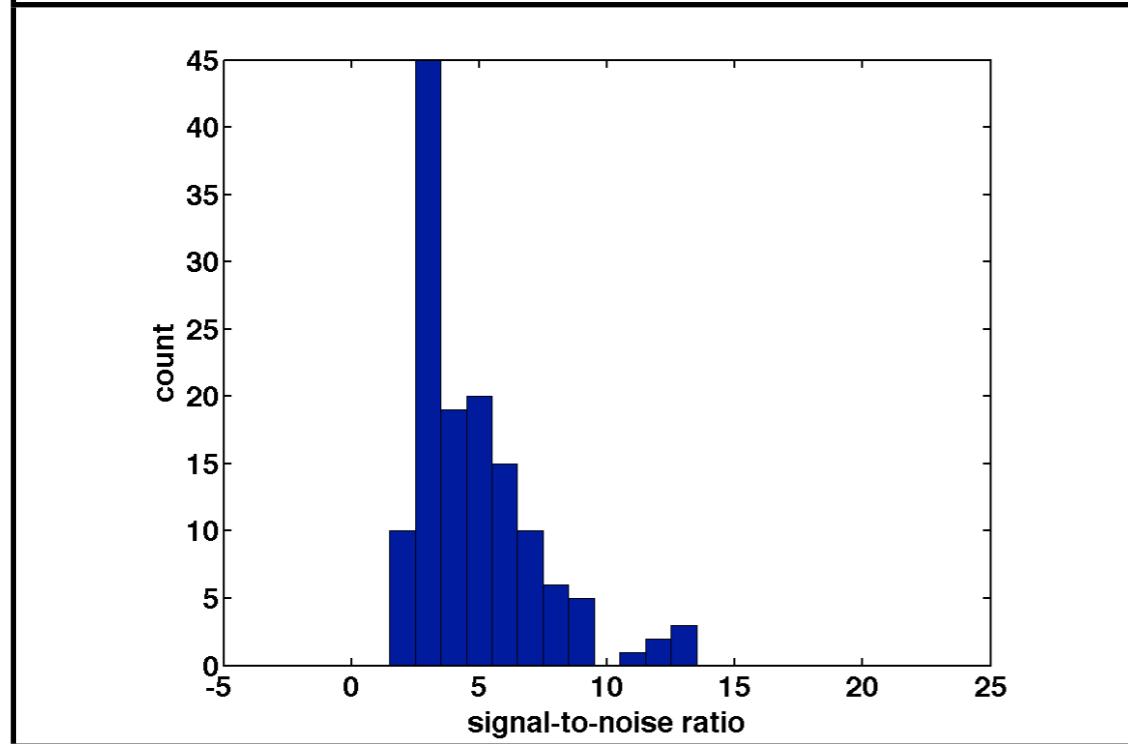
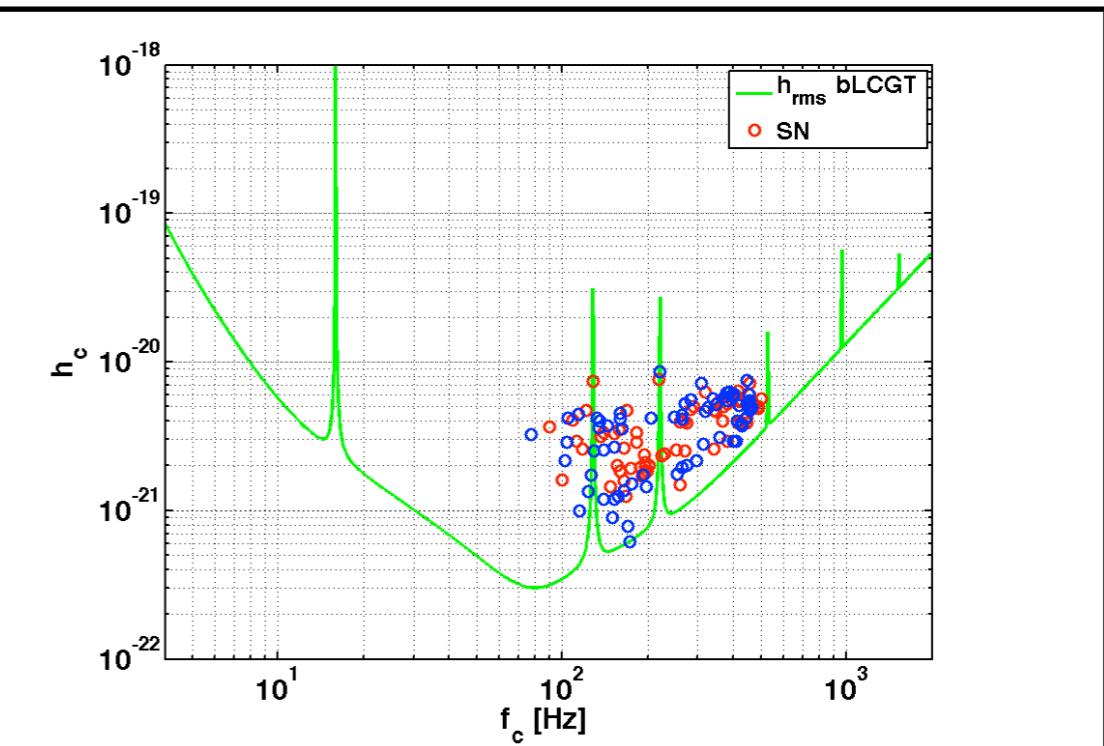


- 20K25W: 56 in 136 models are snr>5, 23K75W: 26 in 136

20K25W

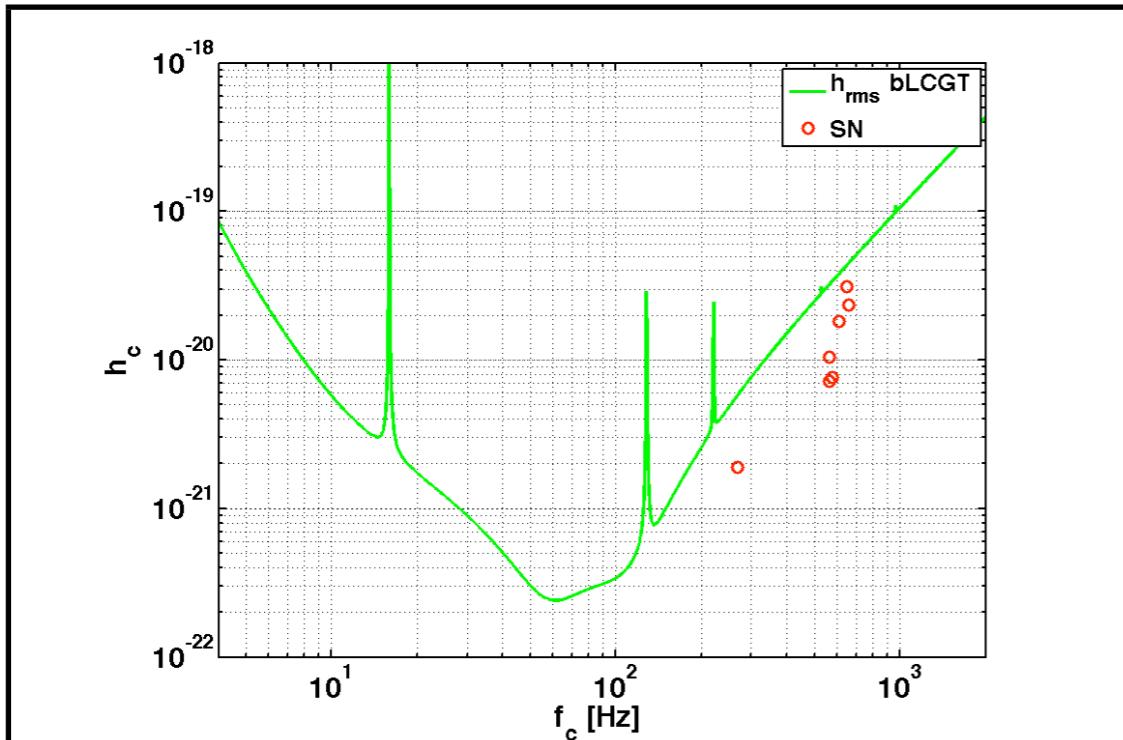


23K75W

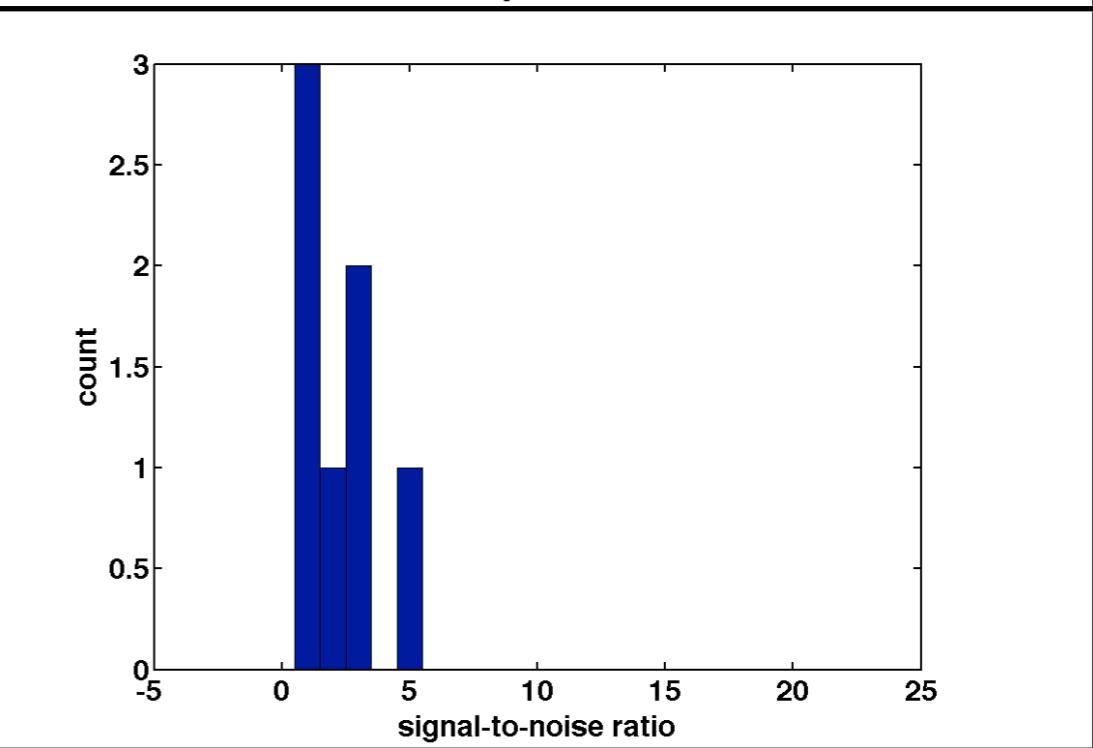
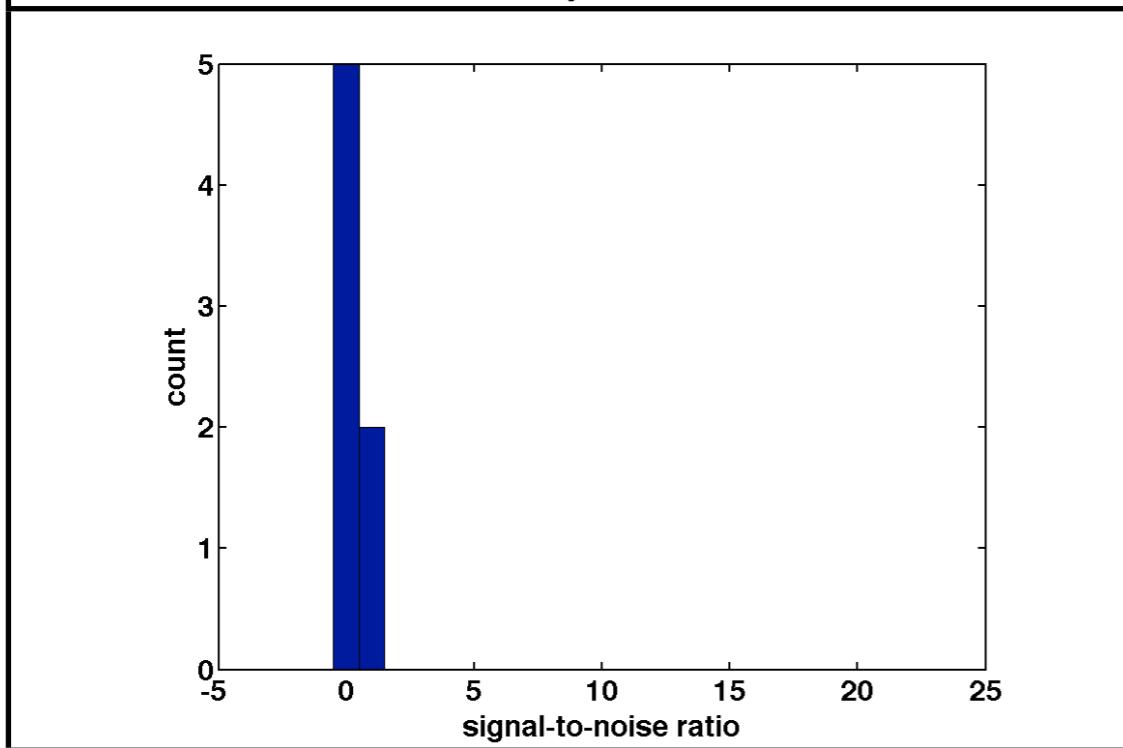
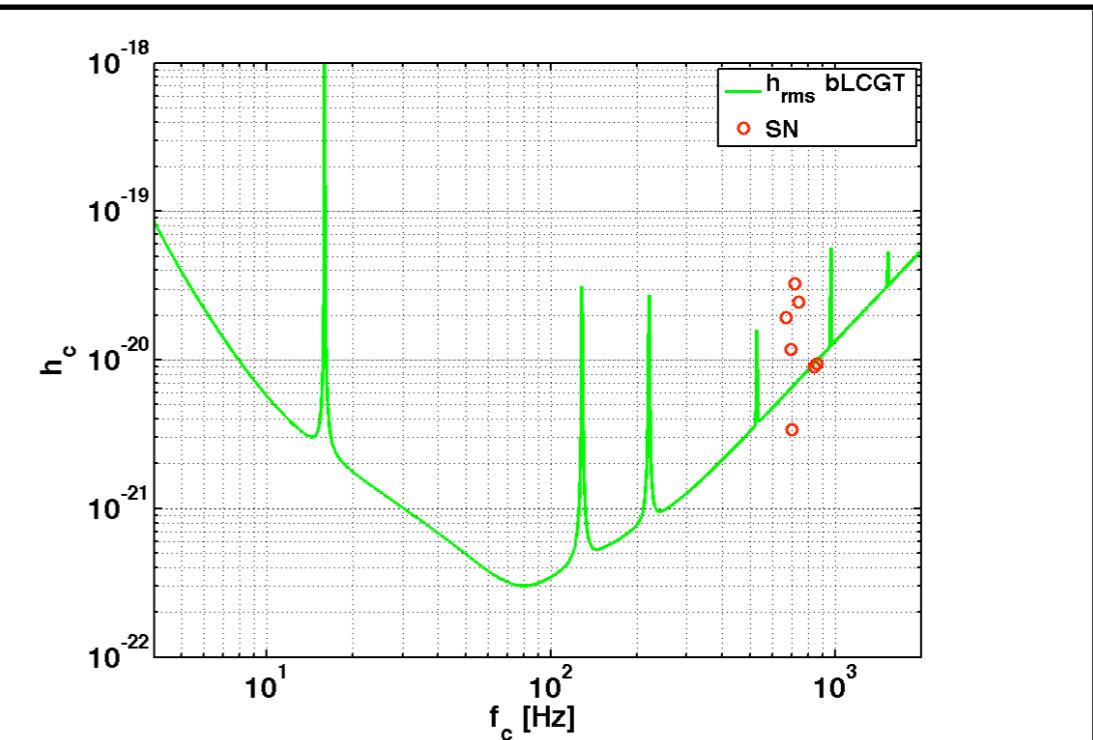


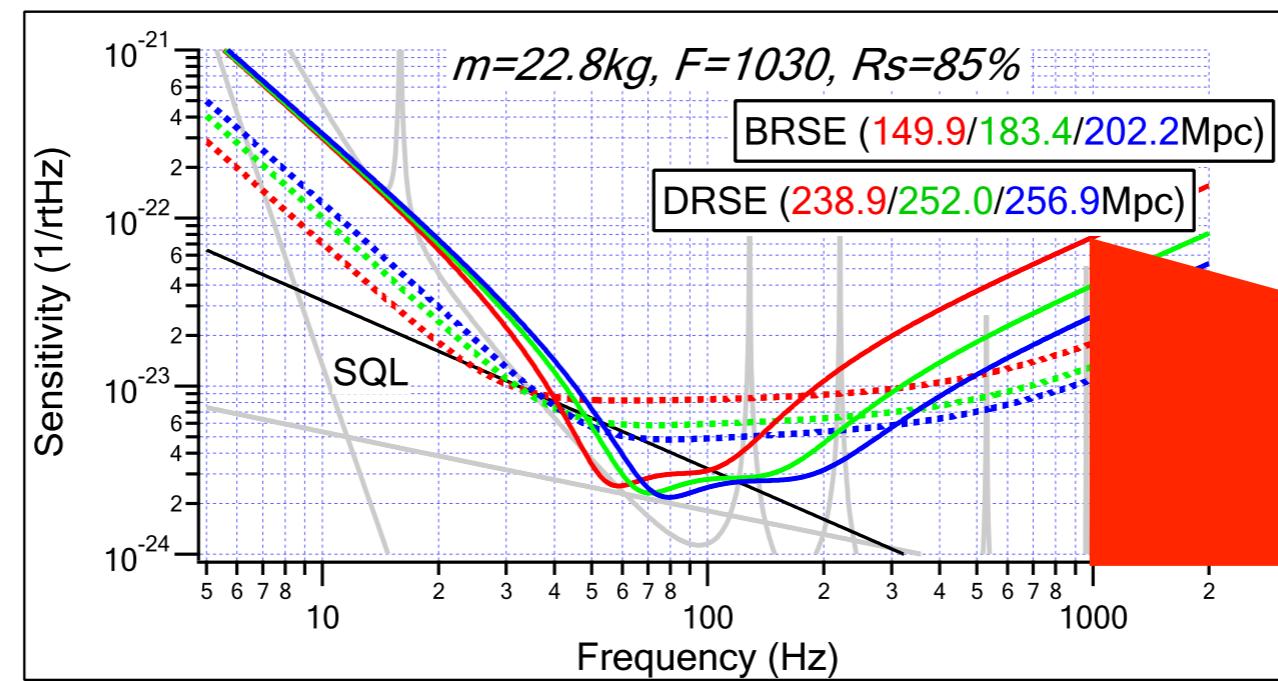
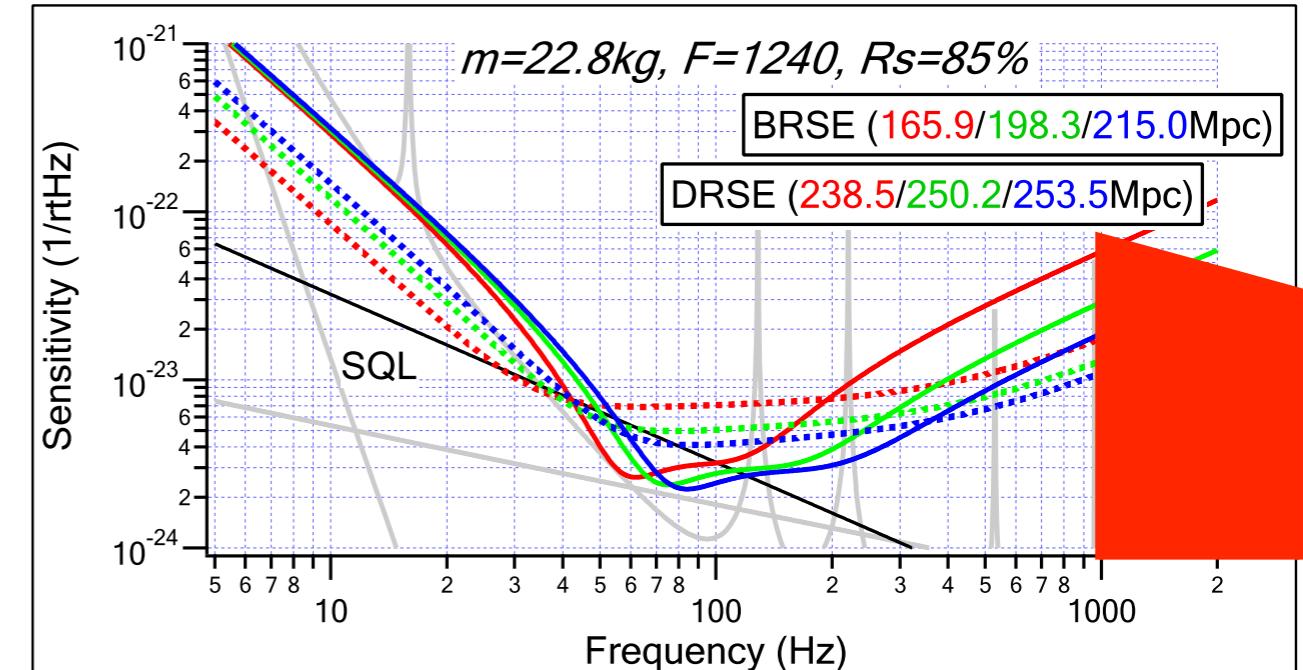
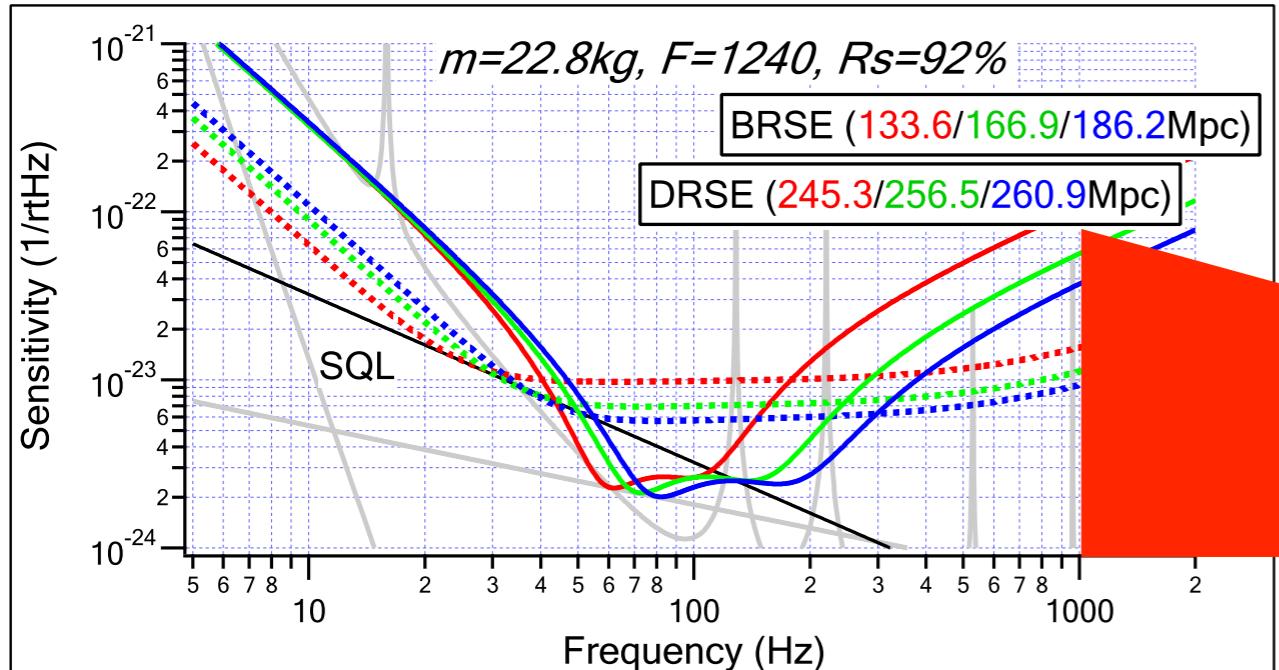
● 20K25W: 0 in 7 models are snr>5, 23K75W: 0 in 7

20K25W



23K75W







- LCGTの2セットのパラメータ構成を用いて、10kpcで起こった超新星爆発からの重力波の検出感度についてしらべた。
- その結果20K25Wの方が、23K75Wよりも若干SNRが良いことが分かった。
- 超新星爆発からの重力波のように広い周波数帯にまたがる信号で、かつ100Hz付近に比較的強いエネルギーを持っている場合には20K25Wの方がよいのだろう。
- 星震によって励起される重力波に関しては、kHz帯に強いピークを持つので、23K75Wの方が良い。