Supernova Science Case document for 3G detectors

Work started after DAWN 2016 meeting. Tentative plan papers to be included:

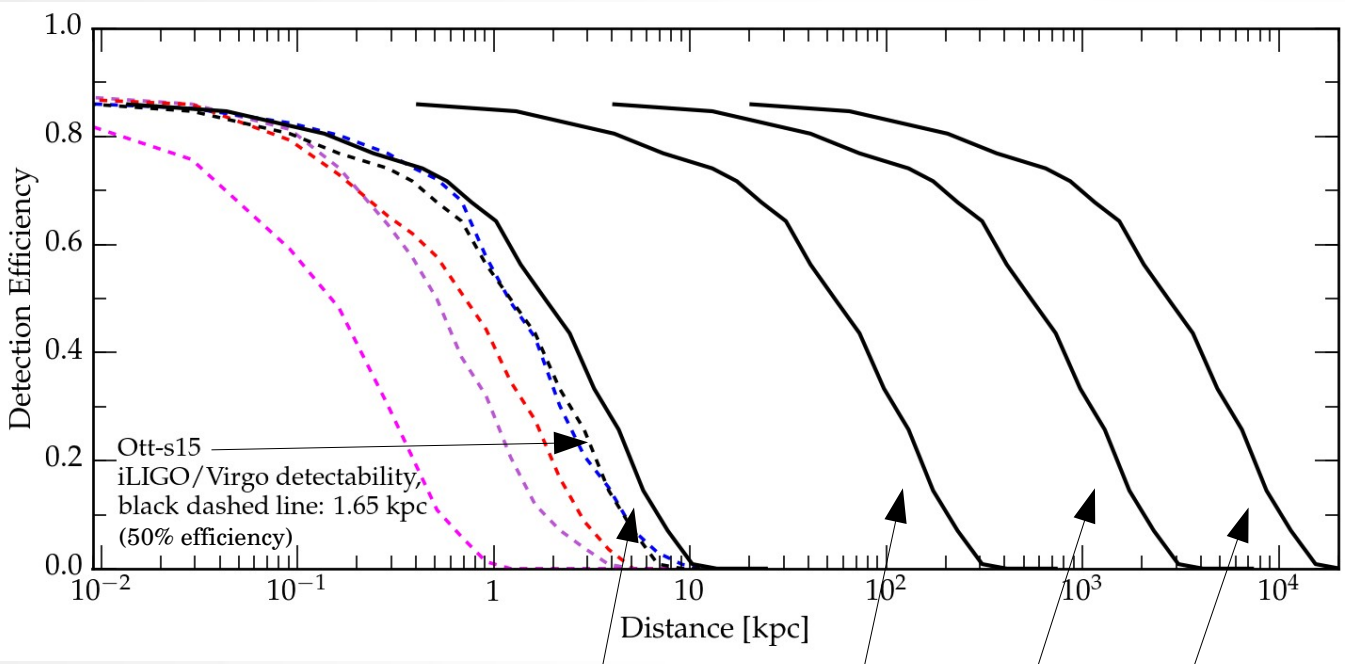
- Local Universe CCSN Rate paper with counting techniques studies (Gill, Branchesi, Zanolin, Szczepanczyk)
- Distributional Tests (Szczepanczyk, Schwalbe, Zanolin, Hughey, Katsavounidis)
- Testing performance of envelopes of SN waveforms (Vitale, Zanolin, Mezzacappa, Gill, Szczepanczyk, Yakunin)
- Bayes-Wave follow up papers (Gill, Wang, Zanolin, Szczepanczyk, Valdez)
- Single Detector Case (Gaudio, Szczepanczyk, Staats, Cavaglia, Zanolin)

Some of the additional references:

- Sensitivity studies for different GW network configurations (Szczepanczyk, Zanolin, Gill)
- SMEE performance for 3G detectors (Roma, Powell)

Initial sensitivity studies (presented in Valencia, December 2015)

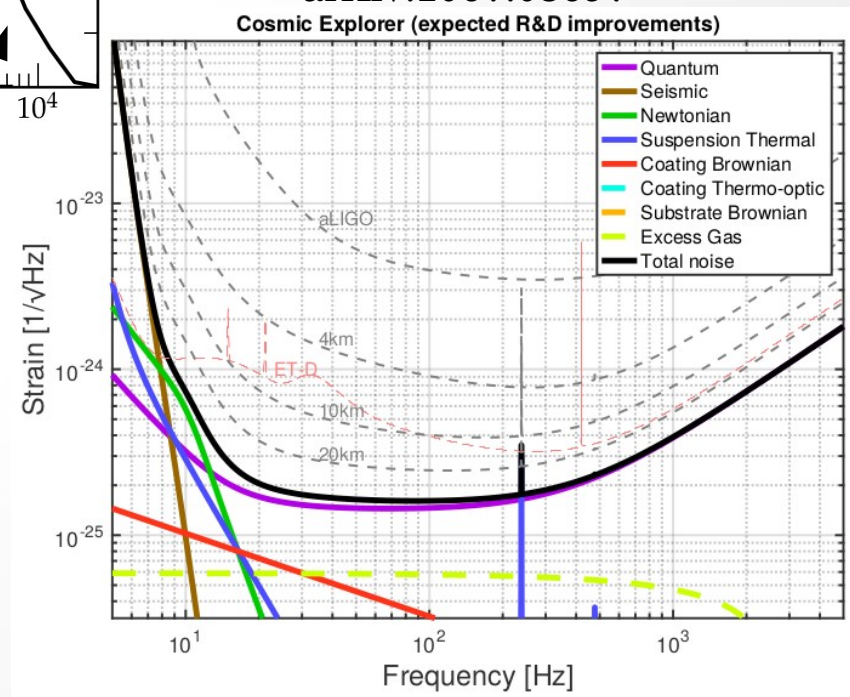
From iLIGO/Virgo SN search, PRD 94, 102001 (2016):



Can we achieve sensitivity to reach 1SN/year rate?

1SN/year → ~13Mpc
4SN/year → ~20Mpc

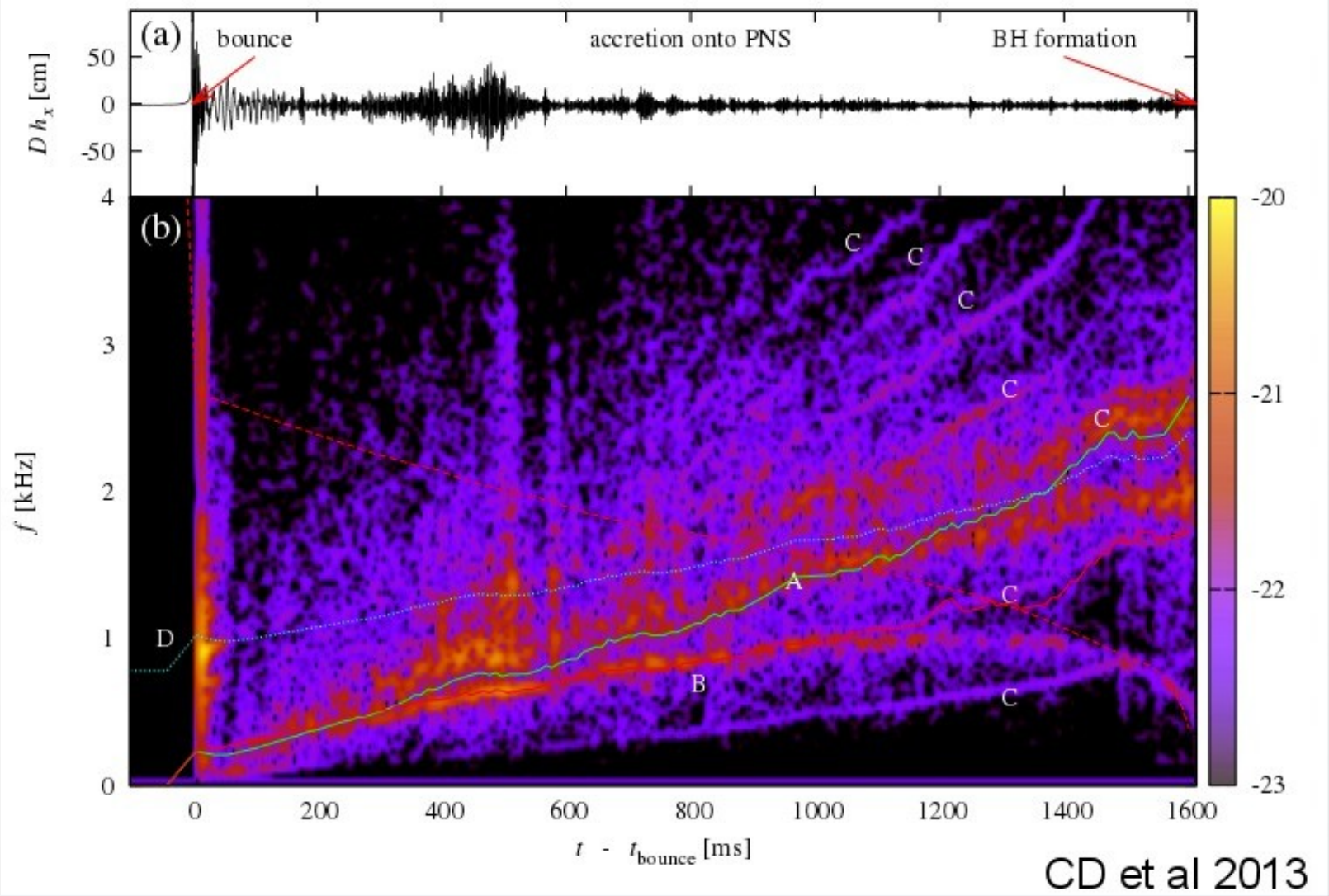
arXiv:1067.08697



Improvements:

- x1.5 (algorithm + BW+ denoising)
- x30 (advanced LIGO design sensitivity)
- x10 (vanilla 3rd generation improvement)
- x5 counting techniques and distributional methods

High Frequency components
Failed Supernovae



Cerda-Duran et al 2013