LIGO

LSC

Deep Underground Environmental Studies for 3rd Generation Gravitational-Wave Detectors

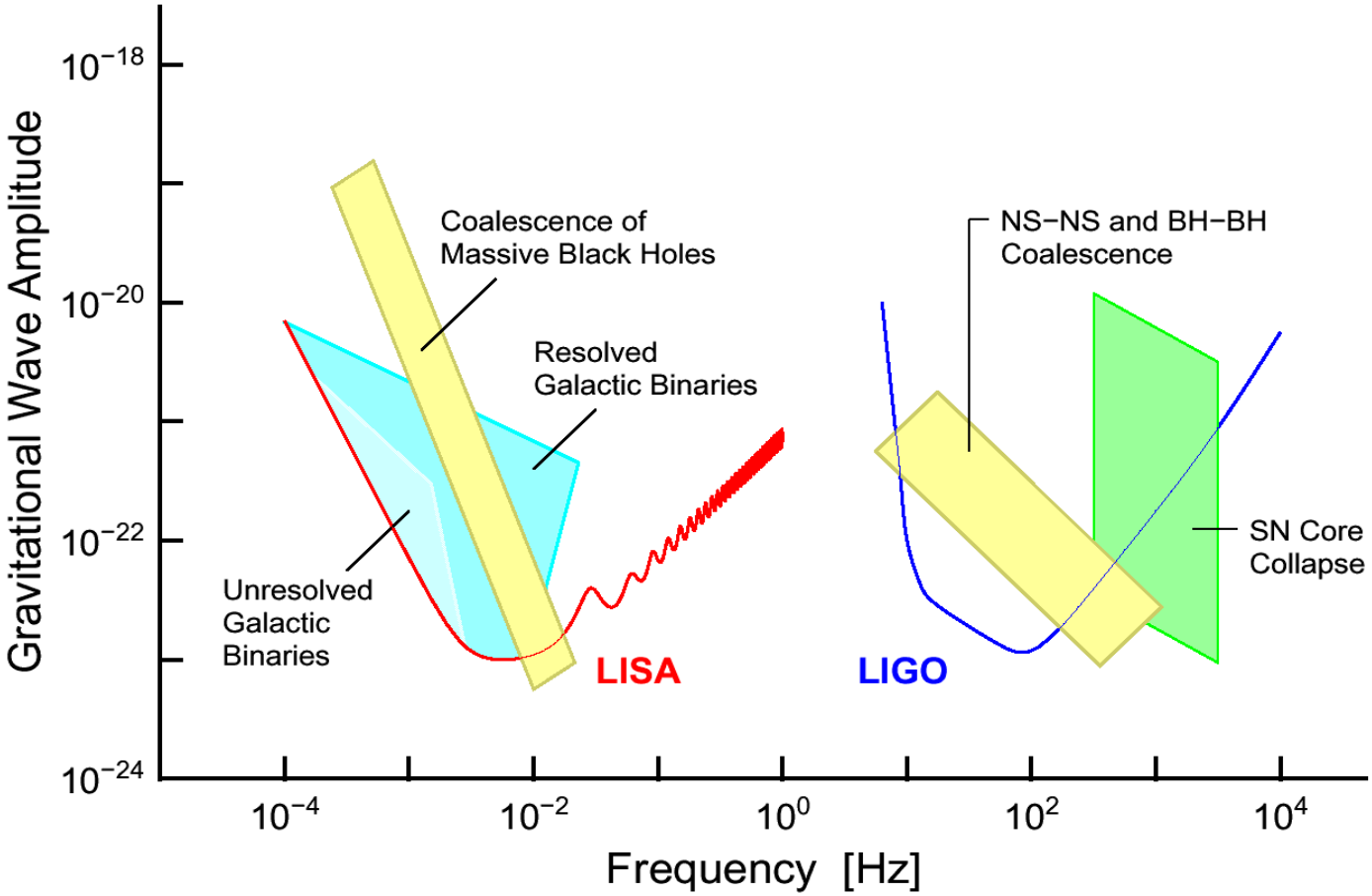
F. Barone[1], M. Becker[2], G. Cella[3], N. Christensen[4], M. Coughlin[4], R. Desalvo[5], S. Dorsher[6], Jan Harms[6], V. Mandic[6], S. Marka[7], D. Rabeling[8], G. Mueller[9], D. Tanner[9], J, van den Brand[2]

[1]INFN Napoli, [2]Nikhef, [3]INFN Pisa, [4]Carleton, [5]Caltech, [6]Minnesota, [7]Columbia, [8]ANU, [9]Florida

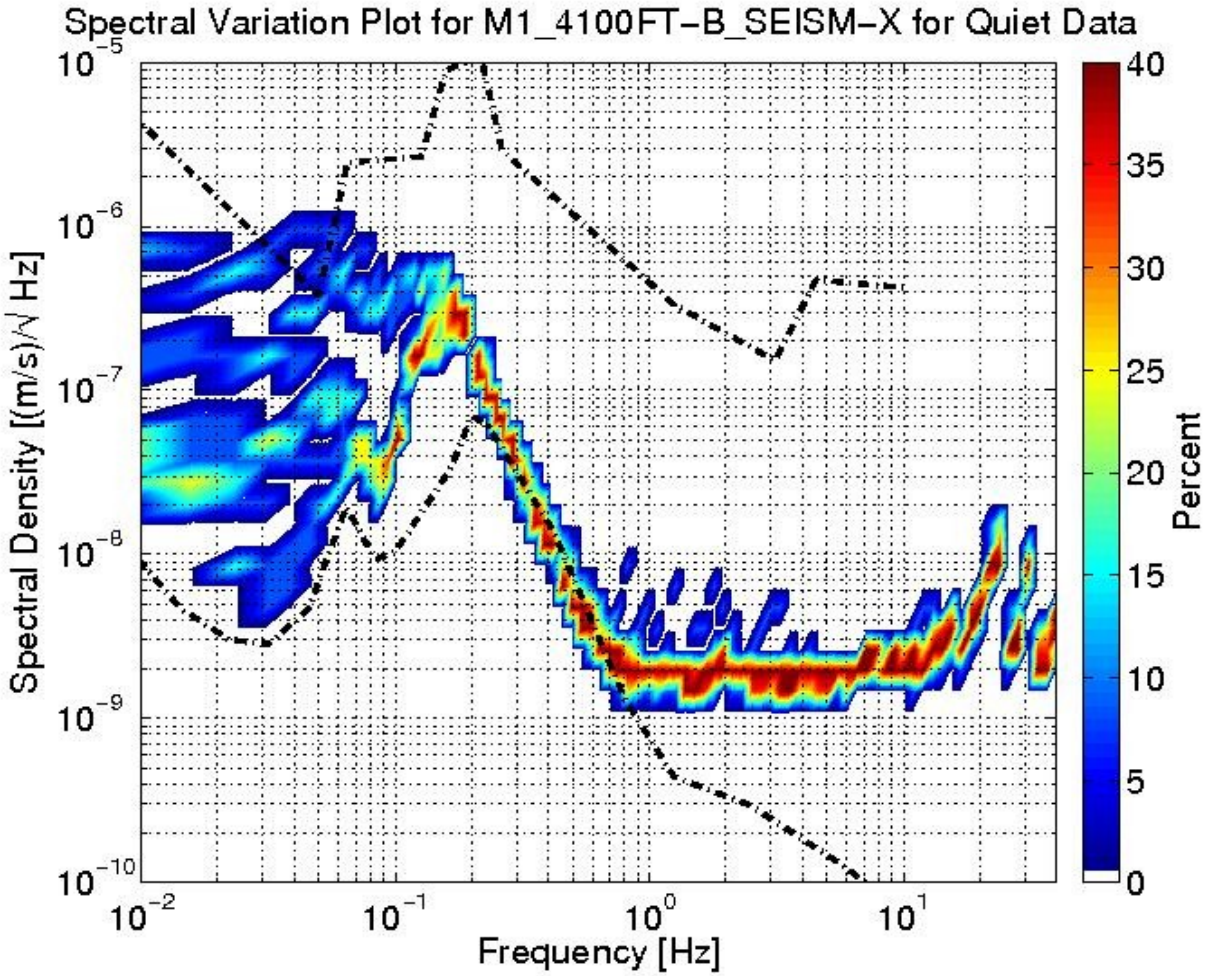
Why Underground?

The 0.1-10 Hz band is not accessible to the current ground based gravitational-wave detectors (LIGO, Virgo).

A variety of gravitational-wave sources are expected in this band.



Characterizing Seismic Noise at the Homestake Mine



While underground environment offers several advantages for gravitational wave detectors, these advantages must be quantified. We are developing an array of synchronized seismic stations in the Homestake mine, probing the available depth and the vast horizontal extent of the mine. Combined with a finite element model of the underground rock, these measurements will provide an estimate of the gravity gradient noise for a future potential underground GW detector.