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ARC Centre of Excellence for Gravitational Wave Discovery

Neutron star Extreme Matter Observatory – NEMO Bram Slagmolen

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<u>Neutron star</u> <u>Extreme</u> <u>Matter</u> <u>Observatory^[1]</u>

- Focus on BNS mergers
 - Equation of State
 - Late in-spiral and post-merger signatures
- Optimal sensitivity 1-4 kHz range
 - Window comparable to 3G sensitivity
 - Frequency of peak sensitivity under study



- Limited to no low-frequency sensitivity
 - High bandwidth controls
 - Reduced cost
- Configuration similar to LIGO/VIRGO
 - Long signal recycling cavity
 - Alternative signal enhancement techniques
- Next gen 3G technology pathfinder
 - Use 3-4 km infrastructure
 - 2um/1.5um/1um under study
 - Coating facility for large optics

[1] Ackley, K., et al (2020), doi:10.1017/pasa.2020.39



NEMO Technologies

- Laser
 - 2um high power narrow linewidth laser[2]
- Test masses
 - 74 kg Silicon
 - Cryogenics Temp (ITM@123K, ETM@150K)[3]
- Coatings
 - AlGaAs
 - a-Si/SiO2
- Test mass suspension
- Long signal recycling cavity
- Photodetectors @2um
 - DC/RF
 - Quadrant/WFS
 - Cameras

[2] D. P. Kapasi, Opt. Express, 28(3):3280–3288, Feb 2020.
[3] J. Eichholz, Phys. Rev. D, 102:122003, Dec 2020

