GWADW2021 Gravitational Wave Advanced Detector Workshop



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NEMO, the concept of a high frequency gravitational wave detector

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Abstract:

GW170817 was a golden event for multi-messenger astronomy made possible by gravitational wave detection. This this event allowed us to gleam an insight into short gamma-ray bursts, neutron star mergers, jet formation and topology, r-process nucleosynthesis but information about the merger and post-merger phases of the system are still unbeknown to us. A gravitational wave detector engineered to focus on signal frequencies between 0.9-3 kHz would allow us to probe the exotic nuclear physics in the cores of neutron stars in a regime not accessible with the current terrestrial experiments. The Australian gravitational wave detector concept, NEMO [1] builds on a 4 km long dual recycled Fabry-Perot Michelson design with additional upgrades in terms of Silicon test masses, cryogenic suspensions, long signal recycling cavities to allow for a strain sensitivity comparable to 3G detectors in the frequency band of 0.9-3 kHz. In this talk, we also discuss some of the preliminary results pertaining to tunability of the NEMO detector using a variable reflectivity signal recycling mirror [2].

References :

 Ackley, K., Adya, V., Agrawal, P., Altin, P., Ashton, G., Bailes, M., . . . Zhu, X. (2020). Neutron Star Extreme Matter Observatory: A kilohertz-band gravitational-wave detector in the global network. *Publications of the Astronomical Society of Australia*, 37, E047. doi:10.1017/pasa.2020.39
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