GWADW2023 - Gravitational-Wave Advanced Detector Workshop



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Development of a highly sensitive, multi-channel suspension point interferometer

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Inter-platform motion in the seismic frequency range presents a challenge for both current and future generation detectors. Reduction of this movement requires displacement sensing over 3 degrees-of-freedom between each pair of isolation platforms, and the stabilisation outcome is dependent on the sensor performance.

At ANU, we are prototyping a multi-channel, optical displacement sensor. Using a simple Mach-Zehnder interferometer configuration, we unlock the highest potential for optical sensitivity. The multiplexing is provided by Digital Interferometry (DI), distinguishing channels via their optical time-of-flight. This technique requires no additional optical hardware and maximises the simplicity of the setup.

In this talk, we present the latest characterisation of our prototype sensor. We also discuss the challenges in moving towards sub-picometer displacement sensitivity at sub-Hz frequencies, as well as the technical and deployment readiness of our sensor.

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