

## Micromechanical resonators in the whitelight cavity for improved gravitational wave detectors

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The concept of a white light cavity for enhanced signal recycling bandwidth in gravitational wave detectors was first proposed 20 years ago. Initial proposals proposed the use of atomic media to achieve the negative dispersion required. When this approach was shown to have serious noise limits, the concept of an optomechanical negative dispersion filter was proposed. Classical demonstrations showed that negative dispersion was attainable but the requirements on the losses in the optomechanical system are extremely challenging. It requires the creation of ultrahigh quality factor micro-optomechanical resonators. One approach is to create micro-optomechanical resonators through optical trapping. Combined with blue detuning, and servo control, small scale systems can be envisaged that would allow significant improvement in the high frequency performance of gravitational wave detectors. In this talk I will describe research at the University of Western Australia where we are exploring many solutions, including micromechanical cat-flap resonators.