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Substrate transferred aluminum gallium arsenide (AlGaAs) crystalline coatings

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Substrate-transferred crystalline coatings made from aluminum gallium arsenide (AlGaAs) have very low thermal noise compared to the ion beam deposited amorphous oxides used until now in gravitational wave detectors. AlGaAs coatings also show excellent optical properties and both thermal noise and optical performance has been demonstrated in other precision optics applications. The primary challenge to using AlGaAs coatings in future detectors is the coating diameter necessary and the large mass and thickness of the test mases. We present results on 10 cm diameter AlGaAs coatings and propose multiple pathways to implement AlGaAs coatings on upgrades to current detectors with up to 40 kg masses and on future detectors with larger masses. We also show schedule and budget plans that allow AlGaAs to be used in future gravitational wave detectors.

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