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Optical Measurement of SiN Ring Resonators[1] AMY SOUDACHANH, ALEJANDRO GRINE, MICHAEL WOOD, DARWIN SERKLAND, CHRISTOPHER HAINS, Sandia National Labs — Optical gyroscopes are rotation rate sensors utilized for location tracking and motion detection in consumer and military applications. Current technology uses the MEMs gyro in products such as the smart phone while the fiber optic gyro (FOG) is needed in more sensitive applications (e.g. satellites). The MEMS gyro provides a resolution of 10-100°/hr in exchange for its low cost, size, weight, and power (CSWaP). In contrast, the FOG resolves 1-10°/hr at the price of larger CSWaP. Our work aims to design an optomechanical oscillator gyro that has the potential to offer comparable resolution to the FOG while having SWaP similar to the MEMs gyro. In this study, a free space optical measurement setup is built to test inverse quadratic tapered SiN waveguides coupled to SiN ring resonators of various radii. This setup includes two distinct microscopes to offer a top-down view and image of the input facet for rapid coupling and discernment of facet quality. Attached to the setup is an output imaging system to confirm coupling has occurred. So far, coupling efficiency of 4% in a 1.5x0.5 μm waveguide mode at 1550 nm has been achieved. Future work includes increasing coupling efficiency and testing the optical quality of the ring resonators.

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