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Optimization of the Geometric Phase Sensitivity of an Array of Atom Ring Interferometers KARINA SANDOVAL-SANCHEZ, CUNY:LaGuardia Comm College, CHRISTIAN CAMPO, TABITHA RIVERA, CUNY: The City College of New York, JOHN TOLAND, CUNY:LaGuardia Comm College — Sagnac, and Aharonov-Bohm phase shifts are important geometric phase shifts in atom interferometry. These phase shifts characterize rotational and magnetic field interference effects respectively. Theoretical explorations have shown that a series of ring interferometers can be connected in series to increase the sensitivity of the overall device while keeping the maximum path separation less than the coherence length of the atoms. It has also been shown that the application of an area chirp to the rings will further enhance the sensitivity of the array of rings to geometric phase shifts. Area chirp refers to characterizing all of the rings in the array to a fixed percentage of a reference ring, this allows for the phase shifts in each ring to be characterized by one ring. The goal of this project is to determine a set of parameters namely kL, the product of the ring circumference and the wave number and γ, the chirp factor for the area chirp, that optimize the geometric phase sensitivity for an array of N rings. We model the transmission coefficient of a quantum matter wave through an area chirped array of interferometers as a function of phase, using transfer matrices to represent the transmission and reflection of individual rings in the array. Isolated transmission resonances represent the domain of interest, these are regions of high phase sensitivity. After optimizing a ring array without loss we apply velocity broadening to the input matter waves to investigate a more realistic output.

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