

Harnessing Fisher Information for Optical Metrology with Plasmonics and Topological Light

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***Abstract* – In optical metrology, the limit of precision depends on the total Fisher information accessible in a measurement. We show that the flow of Fisher information can be enhanced by using topologically structured light and resonant plasmonic structures and that the total amount of Fisher information can be resonantly enhanced with plasmonic cavities. Optical metrology with sub-atomic precision ($\sim \lambda/10,000$) is demonstrated that traces the positional coordinate of a nanowire exhibiting Brownian motion with a sampling frequency of 1MHz.**