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Locked SU(1,1) Nonlinear Interferometer for Phase Shift Measurements in Triangular Nanohole Arrays EMILY LAYDEN, Oak Ridge National Laboratory, TABITHA COULTER, Furman University, JOSEPH LUKENS, BEN LAWRIE, RAPHAEL POOSER, Oak Ridge National Laboratory — Nonlinear interferometers have proven to be more sensitive than classical interferometers, and classical interferometers have been shown to have a better limit of detection when coupled with a plasmonic sensor. Here we study combining a locked nonlinear interferometer with a plasmonic triangle nanohole array. Locking the nonlinear interferometer provides more substantial information about the noise in the system and makes this type of sensor more accessible for practical applications. We compared the stability of the locked verses the unlocked system and observed a more stable output when locking the interferometer compared to the unlocked system. The system is less susceptible to fluctuations due to air currents, meaning that smaller phase shifts can be resolved. Applying this nonlinear interferometer to a plasmonic sensor, such as a nanohole array exhibiting extraordinary optical transmission, allows for increased sensitivity in the detection of a particular analyte concentration.

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