

## Nanomechanically Nonlinear Photonic Metamaterials

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Picophotonics is the emerging science of interactions of picometer-scale objects and events with light. We demonstrate dimensional metrology and detection of change in position over time with resolution on nanometric to picometric scales by analyzing scattering of electrons or topologically structured light from the nanostructures using artificial intelligence. We show how these techniques can be applied to characterization and optimization of nano-opto-mechanical metamaterials and to fundamental studies of the dynamics of thermal motion and the physics of phonons in photonic nanostructures.