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Spectral frustration and coherence in thermal near-field spectroscopy BRIAN O'CALLAHAN, WILLIAM LEWIS, ANDREW JONES, MARKUS RASCHKE, University of Colorado - Boulder — The thermal near-field is characterized by fundamentally distinct spatial, spectral, and coherence properties compared to far-field thermal radiation. Scattering scanning near-field microscopy (s-SNOM) has recently opened spectroscopic access to the enhanced electromagnetic local density of states associated with electronic and vibrational resonances. We study the influence of the tip on the scattered near-field spectral response due to the frustration of the evanescent thermal field by the tip. With the example of the extrinsic resonance of the surface phonon polariton (SPhP) in SiC we demonstrate redshifts by 0 cm^{-1} to 50 cm^{-1} of the unperturbed 948 cm^{-1} resonance. We model the behavior as a result of tip-sample coupling or effective medium change due to the presence of the tip. We show that the effect is most significant for momentum dependent and strongly dispersive resonances. In addition, distance dependence measurements demonstrate a competition between scattering of the near-field associated with the thermally driven stochastically fluctuating optical polarization and that of the spatially coherent SPhP which is excited. The results indicate the possibility for local tuning of SPhP resonant conditions via evanescent thermal near-field coupling.

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