

Plenary Talk PLV I Mon 8:30 HSZ/AUDI
Cavity-altered superconductivity — ●DMITRI BASOV —
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Is it feasible to alter the ground state properties of a material by engineering its electromagnetic environment? Inspired by theoretical predictions, experimental realizations of such cavity-controlled properties without optical excitation are beginning to emerge. A grand aspiration of cavity quantum materials research is to uncover fundamentally new routes for controlling properties of matter by judiciously tailoring the quantum electromagnetic environment. We devised and imple-

mented a novel platform to realize cavity-altered materials. Single crystals of hyperbolic van der Waals (vdW) compounds provide a resonant electromagnetic environment with enhanced density of photonic states and prominent mode confinement. We interfaced hexagonal boron nitride (hBN) with the molecular superconductor κ -(BEDT-TTF) $_2$ Cu[N(CN) $_2$]Br (κ -ET). Meissner effect measurements demonstrate a strongly altered superfluid density at the hBN/ κ -ET interface. Our work highlights the potential of dark cavities devoid of external photons for engineering electronic ground state properties of complex quantum materials. To appear in Nature in 2026.