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Bi-2212/TaS_2 Van der Waals Junctions: Interplay of proximity induced high-T_c Superconductivity and CDW order[1] ANG LI, XIAOCHEN ZHU, GREGORY STEWART, ARTHUR HEBARD, Univ of Florida - Gainesville, ARTHUR F. HEBARD TEAM, GREGORY R. STEWART COLLABORATION — We present an experimental observation of high-T_c superconducting proximity effect by using four-terminal current-voltage measurements to study the Van der Waals interface between freshly exfoliated flakes of the high-T_c superconductor, Bi-2212, and the CDW-dominated TMD layered material, 1T-TaS_2. For highly transparent barriers, there is a pronounced Andreev reflection feature providing evidence for proximity-induced high-T_c superconductivity in 1T-TaS_2 with a surprisingly large energy gap ($\sim$ 20meV) equal to half that of intrinsic Bi-2212 ($\sim$ 40meV). Our systematic study using conductance spectroscopy dI/dV of junctions with different transparencies also reveals the presence of two separate boson modes, each associated with a "dip-hump" structure. We infer that the proximity-induced high-T_c superconductivity in the TaS_2 is driven by coupling to the metastable metallic phase coexisting within the Mott-CCDW (commensurate CDW) phase.

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