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Plasmonic Superconductivity in Layered Materials M. ROESNER, R. E. GROENEWALD, Department of Physics and Astronomy, University of Southern California, USA, G. SCHOENHOFF, J. BERGES, Institute for Theoretical Physics, University of Bremen, Germany, S. HAAS, Department of Physics and Astronomy, University of Southern California, USA, T. O. WEHLING, Institute for Theoretical Physics, University of Bremen, Germany — Due to a lack of screening in two dimensions the Coulomb interaction is generally enhanced and consequently plays a major role to understand many-body effects within layered materials. In the field of superconductivity it is usually introduced as an approximate, static, and adjustable parameter μ^* which describes only effectively the Coulomb repulsion which is therefore responsible for reduced transition temperatures. Here, we overcome this inadequate handling and present an *ab initio* based material-realistic Coulomb description for doped single layers of MoS_2 which captures simultaneously material-intrinsic, substrate, and dynamical screening processes. Using this model we can reliably describe the resulting plasmonic excitations including both, their coupling to the electrons and their dependence on the environmental screening and doping level. Utilizing Eliashberg theory we show that the low-energy plasmonic modes originating from the dynamically screened Coulomb *repulsion* can actually lead to an effective Coulomb *attraction* and thus to an enhanced transition temperature (T_c). Furthermore, we find an optimal ratio between the substrate screening and the electron doping which maximizes T_c of the induced plasmonic superconducting state.

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