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The role of disorder and electron-electron interactions in the superconductor-insulator transition of molybdenum disulfide JOSEPH PRESTIGIACOMO, NRC Postdoctoral Fellow: US Naval Research Laboratory, ANINDYA NATH, George Mason University, ANTHONY BOYD, ASEE Postdoctoral Fellow: US Naval Research Laboratory, QINGFENG LIU, JUDY WU, Kansas State University, THOMAS SUTTO, MICHAEL OSOFSKY, US Naval Research Laboratory — The 2D layered transition-metal dichalcogenide, MoS2, first garnered interest over 40 years ago when it was discovered that it becomes a superconductor (SC) after electrochemical intercalation with alkali- or alkali-earth metals. Recently, however, a superconductor-insulator (SI) transition was observed in MoS2 by electric-field gating with ionic liquid (IL) dielectrics, substances that enable induced charge-carrier concentrations (n) much larger than are possible using conventional solid-state dielectric gate barriers. Despite this feat, detailed studies of gate-tuned metal-insulator transitions in MoS2 have mainly focused on the understanding the various mobility-reducing scattering mechanisms thought to contribute to the smaller than predicted on/off ratios observed in MoS2-based FETs. In this presentation, we discuss the results of an investigation into the role of disorder and electron-electron interactions in the SI transition of mechanically-exfoliated multilayer and CVD-grown few-layer MoS2 probed by carefully examining their low temperature magneto-transport properties as a function of charge carrier-concentration via IL-gating.

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