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Competition between Weak Localization and Superconductivity in $Ta_{1-x}Pt_xSe_2$ Single Crystal JINYU LIU, Tulane University, ALI RADMANESH, University of New Orleans, JIN HU, Tulane University, LEONARD SPINU, University of New Orleans, ZHIQIANG MAO, Tulane University — Exotic properties such as superconductivity and charge density wave (CDW) in transition metal diachalcogenides (TMDCs) have attracted a great deal of interest in past decades. Research in this area is focused on understanding the interplay between CDW, structure instability and superconductivity in doped/intercalated TMDCs. We have recently studied the Pt doping effect on electronic properties of $2H-TaSe_2$. With only $\sim 2\%$ Pt doping, we observed dramatic changes in its electronic properties. Firstly, Pt doping leads to an evolution from an anisotropic, three-dimensional (3D) metal to a quasi-2D metal. Secondly, while Pt doping suppresses the CDW of $TaSe_2$ only to some extent, its superconducting transition temperature is remarkably increased, from 0.2K to 2.1 K. Moreover, Pt doping induces quantum transport behavior prior to the superconducting transition, i.e. weak localization (WL) and strong competition between WL and superconducting pairing was probed in angle-resolved magnetoresistivity measurements. We will discuss the origin of the evolution of such exotic phenomena.

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