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Electrostatically gated quantum dots in van der Waals materials

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Quantum confinement and manipulation of charge carriers are critical for achieving devices practical for various quantum technologies. Atomically thin transition metal dichalcogenides (TMDCs) have attractive properties such as spin-valley locking, large spin-orbit coupling and high confinement energies which provide a promising platform for novel quantum technologies. In this talk, we present the design and fabrication of electrostatically gated quantum structures based on fully encapsulated monolayer tungsten diselenide (WSe2) aimed at probing the confined electron states in these structures. Furthermore, we show that laterally gated quantum point contacts successfully pinch-off the current across the device with gate voltages consistent with their lithographic widths. Finally, we discuss the origins of the observed mesoscopic transport features related to the emergence of the quantum dots through the WSe2 channel.

Authors: BODDISON-CHOUINARD, Justin (University of Ottawa); BOGAN, Alex (National Research Council Canada (NRC)); HAWRYLAK, Pawel (University of Ottawa); STUDENIKIN, Sergei (National Research Council Canada (NRC)); GAUDREAU, Louis (National Research Council Canada (NRC)); SACHRAJDA, Andrew (National Research Council Canada (NRC)); LUICAN-MAYER, Adina (University of Ottawa)

Presenter: BODDISON-CHOUINARD, Justin (University of Ottawa)

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