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New Directions in Direct Detection: Towards the Mesoscale

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As the age of WIMP-scale dark matter (DM) draws to a close thanks to the ever-increasing sensitivity of direct detection experiments, the majority of DM parameter space outside of the weak scale remains to be explored. Sub-GeV DM can excite electronic transitions in a variety of molecular and nano-scale systems which have sub-eV scale thresholds. Quantum dots are nanocrystals of semiconducting material whose band-edge electronic properties are determined by their characteristic size. I will discuss the importance of molecular and mesoscopic systems as new directions in the direct detection of dark matter focusing on the use of quantum dots as detector targets. I will show that QDs present a particularly interesting target with inherently low-background signals and low-cost scalability.

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