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Developments in sub-GeV dark matter direct detection: Nanomaterials and Molecules

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As the WIMP draws under increasing tension thanks to the ever increasing sensitivity of direct detection experiments, the majority of dark matter parameter space outside of the weak scale remains unexplored. Molecular and nano-scale systems are particularly well-suited to look for sub-GeV DM since their eV-scale electronic transitions may be excited through light dark matter interactions. Here, 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 (QDs) and organic crystals as detector targets. I will show that QDs present a particularly interesting target with inherently low-background signals and low-cost scalability. I will present the molecular Migdal effect as a new directional method to detect DM nuclear recoils using molecular systems. Finally, I will discuss the potential synergy between nanomaterials and molecules as well as applications of these formalisms for indirect detection.

Presenters: BLANCO, Carlos; BLANCO, Carlos

Session Classification: Plenary Session - Chair Viviana Gammaldi