Shadows in the Dark: Probing Dark Matter Models

The existence of Dark Matter (DM) has been established beyond reasonable doubts. In this talk I shall discuss the following of Dark Matter scenarios, constraints, and prospects of their detection. First, within a simple supersymmetric framework, I shall focus on the status of sneutrino as a DM candidate and discuss possible implications at the LHC in the context of a simple naturalness motivated set-up. Subsequently, I will motivate a simplified DM scenario with large self-interactions, and describe constraints and search strategies involving direct detection, flavor physics and collider searches. I will comment on the viability of thermal relic DM in each of these cases. Finally I shall discuss a particular non-thermal production mechanism for the Dark Sector.