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Pushing the Limits of Dark Matter: From the Cosmos to the Lab

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The search for dark matter, which constitutes approximately 27% of the universe's present-day energy density, remains one of the central challenges in modern physics. Despite compelling evidence from astrophysical and cosmological observations, its particle nature has yet to be identified through direct detection. In this talk, I will provide an overview of the dark matter landscape and the current status of experimental search efforts. I will discuss the importance of recent methodological advances in the theoretical prediction of the dark matter abundance and outline innovative approaches to testing dark matter scenarios, highlighting the complementarity of early-universe cosmology and terrestrial experiments.