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Infinite Distance Limits and Emergent Structures in Supersymmetric Conformal Manifolds

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Conformal Field Theories serve as a cornerstone in theoretical physics, playing essential roles in the study of quantum field theory, string theory, statistical systems, and holography. When these theories admit exactly marginal couplings, they organize themselves into families described by conformal manifolds—moduli spaces endowed with rich geometric structures. Understanding these spaces provides a non-perturbative window into strongly coupled regimes of quantum field theories especially in four dimensions with supersymmetry.

This talk focuses on exploring the local and global structure of these conformal manifolds, with a particular emphasis on infinite distance limits in 4D Superconformal Field Theories. We aim to investigate the emergence of higher spin operators, tensionless strings, and the connections to the Swampland Distance Conjecture. The analysis combines conformal field theory techniques, representation theory, integrability, and insights from string theory.

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