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Dark Sector and the Swampland

Thursday 10 July 2025 10:00 (30 minutes)

The Swampland program, which explores the UV consistency conditions of
quantum gravity, imposes stringent constraints on viable cosmological models of dark energy. In this talk, I begin by reviewing how these ideas motivate the existence of an additional spatial dimension-the so-called dark dimension-at the micron scale, with its gravitational excitations emerging as natural candidates for dark matter. I then introduce a two-parameter, Swampland-motivated model featuring variation of the dark dimension length which naturally couples dark energy and dark matter. This model provides an excellent fit to recent cosmological observations from DESI and DES and yields a physically motivated framework that matches the performance of the non-physical CPL parametrization across multiple supernova datasets.

Presenter: VAFA, C.

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