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Zi-Xiao Huang: From Weyl Anomaly to Universal Surface Defect Entropy and Casimir Energy

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Defects serve as a key tool for understanding the non-perturbative properties of the quantum field theory. In general, defect insertions lead to nontrivial contributions to observables including entanglement measure and the ground state energy. We establish a universal relation between surface defect Weyl anomalies and the entanglement measure in higher-dimensional quantum field theories. In particular, we focus on surface defects in 6d (2,0) theories and show that the defect contribution to twisted R\'enyi entropy is governed by the defect Weyl anomalies. We also derive a closed-form expression for the defect contribution to the twisted Casimir energy, establishing a direct connection between defect anomalies and the ground state energy in higher-dimensional CFTs. The comprehensive method we develop combines supersymmetric localization, anomaly polynomials and holography, with potential applications to broader conformal field theories with defects. [Based on arXiv:2501.09498]