

End of the World Branes and Chiral Theories

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Chirality provides a powerful topological tool to study the cobordism conjecture, which states that any theory of quantum gravity should admit end of the world (ETW) boundaries of spacetime. I discuss two realizations of this idea: First, I consider explicit 6d and 4d string theory models realizing gravity theories with chiral matter content, and construct explicit ETW boundaries which gap the chiral non-anomalous sector via strong coupling phenomena, such as strongly coupled phase transitions or symmetric mass generation. Second, I consider a class of 5d gravity theories (closely related to holographic $\text{AdS}_5 \times S^5$ setups) with 4d ETW branes supporting chiral anomalous fermions. The boundaries are AdS_4 Karch-Randall branes, supporting localized gravity, and leading to a seemingly anomalous (hence inconsistent) 4d gravity theory, which is happily saved by an anomaly inflow from the 5d bulk. This motivates the concept of Relative Quantum Gravity Theory, which posits that a D -dimensional gravity theories may seem to violate familiar quantum gravity and swampland constraints, but attain a consistent completion when coupled to a $(D+1)$ -dimensional theory.

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