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Wilson Loops & Euclidean Wormholes

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Euclidean wormholes are exotic types of gravitational solutions that still challenge our physical intuition and understanding. After reviewing universal properties of asymptotically AdS wormhole solutions from a gravitational (bulk) point of view and the paradoxes they raise, I will describe some concrete (microscopic) field theoretic setups and models that exhibit such properties. These models can be reduced to matrix integrals and crucially involve correlated ("entangled") sums of representations of the boundary symmetry group. Our final focus will be the example of heavy correlated Wilson loops in $\mathcal{N} = 4$ SYM and related "bubbling wormhole" geometries in type IIB SUGRA.

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