- **Low-lying string state mixing in the D1-D5 orbifold CFT**
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Originating from string theory, the fuzzball programme pioneered by S.D. Mathur has sparked important advances in understanding black hole entropy and the information paradox. One of the best-studied systems is the D1-D5 system obtained by wrapping N_1 D1-branes on S^1 and N_5 D5-branes on $S^1 \times T^4$. Its entropy can be computed either from the Bekenstein-Hawking formula or from the partition function of open strings and D-branes. This system has a moduli [parameter] space, with different physical descriptions at different points. The black hole description differs from the microscopic description, which is a (super)conformal field theory living on the symmetric orbifold $(T^4)^N/S_N$, where $N = N_1 * N_5$. Our work is a contribution to studying the microscopic side as we deform away from the orbifold point towards the black hole.

In the first of two companion papers 1211.6689 and 1211.6699, we generalize Lunin-Mathur technology for computing correlation functions in the D1-D5 orbifold CFT to cover non-twist sector states and certain classes of excitations of twist sector states. In the second, we develop a method for tracking operator mixing and anomalous dimensions of string states as the CFT is marginally deformed away from the orbifold point. Specifically, for the low-lying string state $\partial X \partial X \bar{\partial} X \bar{\partial} X$, we show that it acquires an anomalous dimension at first order in conformal perturbation theory and compute the mixing coefficient. Our main tool is investigating factorization limits of four-point functions containing two of the low-lying string state operators and two deformation operators. This helps us identify which operators participate in mixing and cuts down on the work involved in diagonalizing to find the anomalous dimensions.