

From 3d dualities to 2d free field correlators and back

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Infra-red dualities are interesting phenomena that may characterize the low energy behaviour of quantum field theories. One challenging question is whether it is possible to find some organizing principle that allows us to derive the currently known dualities in low dimensions from some mother dualities in higher dimensions upon dimensional reduction. When the theory is supersymmetric, this problem can be effectively tackled using supersymmetric localization. This technique also allowed us to discover gauge/CFT correspondences, where exact quantities in supersymmetric gauge theories are mapped to CFT correlators. In this talk, I will first discuss an instance of such correspondences by presenting a connection of 3d $\mathcal{N} = 2$ theories with 2d CFT free field correlators, which can be obtained as a suitable limit of the $S^2 \times S^1$ partition function. After establishing this dictionary, I will show how the logic of the dimensional reduction can be pushed further and even reversed, uplifting some known integral identities for 2d free field correlators to new IR dualities in 3d.

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