

Three Dimensional Topological Field Theories and Nahm Sum Formulas

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Abstract:

It is known that a large class of characters of 2d conformal field theories (CFTs) can be written in the form of a Nahm sum. In \cite{Zagier:2007knq}, D. Zagier identified a list of Nahm sum expressions that are modular functions under a congruence subgroup of $SL(2, \mathbb{Z})$ and can be thought of as candidates for characters of rational CFTs. Motivated by the observation that the same formulas appear as the half-indices of certain 3d $N=2$ supersymmetric gauge theories, we perform a general search over low-rank 3d $N=2$ abelian Chern-Simons matter theories which either flow to unitary TFTs or $N=4$ rank-zero SCFTs in the infrared. These are exceptional classes of 3d theories, which are expected to support rational and C_2 -cofinite chiral algebras on their boundary. We compare and contrast our results with Zagier's and comment on a possible generalization of Nahm's conjecture.