Spectral sums rules for conformal field theories in arbitrary dimensions

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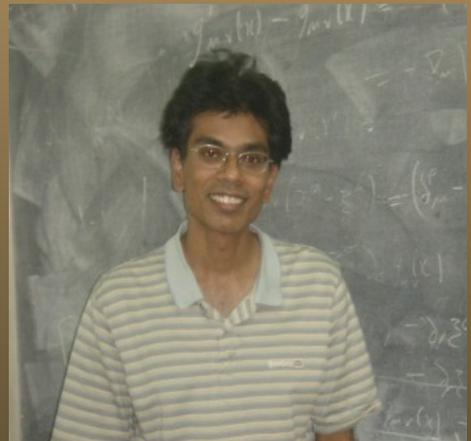
(Duration and Location are subject to irreducible jitter)

We derive spectral sum rules in the shear channel for conformal field theories in general $d > 3$ dimensions. The sum rules result from the OPE of the stress tensor at high frequency as well as the hydrodynamic behaviour of the theory at low frequencies. The sum rule states that a weighted integral of the spectral density over frequencies is proportional to the energy density of the theory. We show that the proportionality constant can be written in terms of the data which determines the three point function of the stress tensors of the CFT. For theories which admit a two derivative gravity dual this proportionality constant is given by $d/(2(d+1))$. We then use causality constraints and obtain bounds on the sum rule which are valid for any conformal field theory. Finally we demonstrate that the high frequency behaviour of the spectral function in the vector and the tensor channel are related to the Maldacena-Hofman coefficients.

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