

An application of melonic CFTs: The F-theorem

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According to the F-theorem, the free energy on the sphere for a three-dimensional CFT decreases along the renormalization group flow. I will present here a generalization of this theorem to the long-range bosonic $O(N)^3$ tensor model. This model is a melonic CFT which displays four lines of fixed points at large N , parametrized by a purely imaginary coupling. It was non-trivial to show that the F-theorem is satisfied by this model as it was proven for unitary CFTs while the long-range $O(N)^3$ model presents only hints of unitarity at large N .

In the first part of the talk, I will explain how to put a CFT on the sphere and will present a simple example via a flow between two gaussian CFTs. In the second part of the talk, I will quickly review the key features of the long-range $O(N)^3$ model and then show that it indeed satisfies the F-theorem. As an added bonus, we show how an infinite series of ladder diagrams can be resummed using conformal partial wave expansion.

Orateur: HARRIBEY, Sabine (CPHT Ecole Polytechnique - Heidelberg University)