

The $O(N)$ model at large charge and the quartic/cubic equivalence

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The large-charge expansion can be employed to find and test dualities in QFT. I illustrate this point by investigating the quartic $O(N)$ model between four and six dimensions, where it develops a metastable UV fixed point that is believed to be equivalent to the IR fixed point of an $O(N)$ model featuring cubic interactions. By focusing on the cubic model just below six dimensions, I show how large-charge methods allow matching an infinite series of terms between the two descriptions, reinforcing the conjectured equivalence. Next, I analyze the stability of the large-charge sector of the two models by discussing the onset of complex CFT dynamics above a critical value of the charge.

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