

Yuya Tanizaki: Modified instanton sum in 4d gauge theories

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Abstract: In the path integral formulation of quantum field theories (QFTs), we are supposed to sum up all possible field configurations to ensure the locality in the usual lore. In the case of 4d gauge theories, this would require us to sum up all the instanton sectors, which topologically classify the gauge-field configurations in the closed spacetime. However, it turns out that this is not mandatory, and there are other consistent choices to define QFTs. We show that restricting the instanton sectors can be consistent with locality as a consequence of “Decomposition”. Starting from a brief review of the decomposition in 2d QFTs, we will tell how this interesting property can be generalized to higher-dimensional QFTs, and also explain the concrete example using 4d Yang-Mills theory.