UM Physics Department

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Name: Vishnu Jejjala

Title: (K)not Machine Learning

Abstract:

We present a simple phenomenological formula which approximates the hyperbolic volume of the knot complement based on an evaluation of the Jones polynomial at a complex phase. The error is 2.86% on the first 1.7 million knots. This approximate formula is obtained from reverse engineering a neural network which achieves a similar error after training on 10% of the data. In Chern-Simons language, the phase corresponds to fractional level. We interpret this in terms of the analytic continuation of Chern-Simons theory.