

Calabi-Yau Metrics from Machine Learning

Monday 14 December 2020 16:15 (30 minutes)

The metric of the extra-dimensions in string theory contains crucial information about the low-energy dynamics of string theory systems. This talk reports on recent work (2012.04656) where we use machine learning to approximate Calabi-Yau and $SU(3)$ -structure metrics, including for the first time complex structure moduli dependence. Our new methods furthermore improve existing numerical approximations in terms of accuracy and speed. In the case of $SU(3)$ structure, our machine learning approach allows us to engineer metrics with certain torsion properties not accessible with previous numerical techniques. I comment on some applications, ranging from computations of crucial aspects of the effective field theory of string compactifications such as the canonical normalizations for Yukawa couplings, and the massive string spectrum which plays a crucial role in swampland conjectures, and mention applications to mirror symmetry and the SYZ conjecture.

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