Institut Henri Poincaré

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String Theory in Greater Paris

Rencontres Théoriciennes

“Supergravité, théorie des cordes et théorie M”

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Anthony Ashmore

LPTHE

Machine learning for geometry and string compactifications

Understanding Calabi-Yau metrics and hermitian Yang-Mills connections has long been a challenge in mathematics and theoretical physics. These geometric objects play a crucial role in constructing realistic models of particle physics in string theory. However, with no closed-form expressions for them, we are unable to compute basic quantities in top-down string models, such as particle masses and couplings.

Breakthroughs in machine learning have opened a new path to tackle this problem. After recalling the relationship between these geometric ingredients and 4d effective field theory, I will review recent progress in using machine learning to calculate these metrics and connections numerically. Finally, I will highlight how this newly available geometric data can be used, including studying the spectrum of Laplace-type operators on a Calabi-Yau in the presence of a background gauge field.

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