Contribution ID: **42** Type: **not specified**

Hidden structures in the landscape of heterotic line bundle models

Thursday, 17 December 2020 11:30 (45 minutes)

We show that neural networks can detect hidden structures in the string landscape, in particular, heterotic string theory on Calabi-Yau threefolds with line bundles. It turns out that three-generation models cluster in particular islands specified by deep autoencoder networks and k-means++ clustering.
Especially, we explore mutual relations between model parameters and the cluster with densest three-generation models (called "3-generation island"). We find that the 3-generation island has a strong correlation with the topological data of Calabi-Yau threefolds, namely, second Chern class of the tangent bundle of the Calabi-Yau threefolds.
Reference: arXiv:2003.11880 [hep-th]

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Session Classification: Invited talks