HARVARD UNIVERSITY
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Mathematical Picture Language Seminar

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9:30 a.m. Boston time

Training landscapes for parameterized quantum circuits

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Abstract: Parameterized quantum circuits (PQCs) are the leading proposal for near-term quantum computing, with applications including electronic structure, dynamical simulation, and solving linear systems. However, recent progress in understanding the training landscapes for PQCs paint a concerning picture. Exponentially vanishing gradients—barren plateaus—occur for various situations, including circuits that are deep or noisy or generate much entanglement. This can lead to exponential resource scaling for algorithms based on PQCs. On the flip side, some architectures for PQCs are immune to barren plateaus. Moreover, the dynamical Lie algebra for a PQC has been connected to presence or absence of barren plateaus, leading to an algebraic theory for the trainability of PQCs. This theory could allow us to engineer favorable training landscapes for PQCs. In this talk, I will overview our theoretical understanding of PQCs training landscapes and how we might engineer them to achieve scalability for near-term quantum computing.

Zoom QR Code & Link:
https://harvard.zoom.us/j/779283357?pwd=MitXVm1pYUlJVzZqT3lwV2pCT1ZUQT09

https://mathpicture.fas.harvard.edu/seminar