

HARVARD UNIVERSITY  
17 Oxford Street  
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Tuesday, October 22, 2019  
3:30 p.m.

**Mathematical Picture Language Seminar**  
**Jefferson 356**

“Quantum 4d Yang-Mills Theories and Time-Reversal Symmetric 5d Higher-Gauge TQFT”

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**Abstract:** We explore 4d Yang-Mills gauge theories (YM) living as boundary conditions of 5d gapped short/long-range entangled (SRE/LRE) topological states. Specifically, we explore 4d time-reversal symmetric pure YM of an  $SU(2)$  gauge group with a second-Chern-class topological term at  $\theta=\pi$  ( $SU(2)_{\theta=\pi}$  YM), by turning on background fields for both the time-reversal (i.e., on unorientable manifolds) and 1-form center global symmetry. We comment on that such 4d Yang-Mills dynamics cannot be trivially confined gapped. The work is based mainly on <https://arxiv.org/abs/1904.00994>, also <https://arxiv.org/abs/1812.11967> and <https://arxiv.org/abs/1810.00844>.

This talk is related to my IAS seminar: <https://www.youtube.com/watch?v=GUMheJboWBs>