



HARVARD UNIVERSITY  
17 Oxford Street  
Cambridge, MA 02138

# Mathematical Picture Language Seminar



**Tuesday, May 14**

**4:30 p.m. Boston time**

**Jefferson 256**

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Harvard University

## Correlated Decoding of Logical Algorithms with Transversal Gates

**Abstract:** Quantum error correction is believed to be essential for scalable quantum computation, but its implementation is challenging due to its considerable space-time overhead. Motivated by recent experiments demonstrating efficient manipulation of logical qubits using transversal gates (Bluvstein et al., Nature 626, 58-65 (2024)), in this talk I will discuss an approach to improve the performance of logical algorithms by decoding the qubits jointly to account for physical error propagation during transversal entangling gates. By considering deep logical Clifford circuits, we find that such correlated decoding can significantly improve the space-time cost by reducing the number of rounds of noisy syndrome extraction per gate. These results demonstrate that correlated decoding provides a major advantage in early fault-tolerant computation, and indicate it has the potential to reduce the space-time cost in large-scale logical algorithms.



Zoom QR Code & Link:

<https://harvard.zoom.us/j/779283357?pwd=MitXVm1pYUIJVzZqT3lwV2pCT1ZUQTog>

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