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**Neural network decoder for quantum error correcting codes** STEFAN KRASTANOV, LIANG JIANG, Yale University — Artificial neural networks form a family of extremely powerful - albeit still poorly understood - tools used in anything from image and sound recognition through text generation to, in our case, decoding. We present a straightforward Recurrent Neural Network architecture capable of deducing the correcting procedure for a quantum error-correcting code from a set of repeated stabilizer measurements. We discuss the fault-tolerance of our scheme and the cost of training the neural network for a system of a realistic size. Such decoders are especially interesting when applied to codes, like the quantum LDPC codes, that lack known efficient decoding schemes.

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