

# Dimensional Expressivity Analysis of Parametric Quantum Circuits

*Tuesday 13 July 2021 15:00 (1 hour)*

Parametric quantum circuits play a crucial role in the performance of many variational quantum algorithms. To successfully implement such algorithms, one must design efficient quantum circuits that sufficiently approximate the solution space while maintaining a low parameter count and circuit depth. In this talk, we present a method to analyze the dimensional expressivity of parametric quantum circuits. This technique allows for identifying superfluous parameters in the circuit layout and for obtaining a maximally expressive ansatz with a minimum number of parameters. Using a hybrid quantum-classical approach, we show how to efficiently implement the expressivity analysis using quantum hardware, and we provide a proof of principle demonstration of this procedure on IBM's quantum hardware. We also discuss the effect of symmetries and demonstrate how to incorporate or remove symmetries from the parametrized ansatz.

**Presenter:** FUNCKE, Lena (Perimeter Institute)