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EUROPEAN CENTRE
FOR THEORETICAL STUDIES
IN NUCLEAR PHYSICS AND RELATED AREAS



UNIVERSITA
DI TRENTO
Dipartimento di
Fisica

Contribution ID: 16

Type: **Talk**

Analysing crosstalk with the digital twin of a Rydberg atom QPU

Friday, 5 May 2023 11:00 (30 minutes)

Decoherence and crosstalk are two adversaries when aiming to parallelize a quantum algorithm: on the one hand, the execution of gates in parallel reduces decoherence due to a shorter runtime, but on the other hand, parallel gates in close proximity are vulnerable to crosstalk. This challenge is visible in Rydberg atom quantum computers where atoms experience strong van der Waals interactions decaying with distance. We demonstrate how the preparation of a 64-qubit GHZ state is affected by crosstalk in the closed system with the help of a tensor network digital twin of a Rydberg atom QPU. Then, we compare the error from crosstalk to the decoherence effects proving the necessity to parallelize algorithms.

Abstract category

Quantum Computing

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