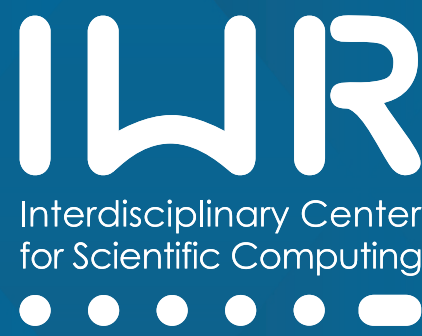




UNIVERSITÄT
HEIDELBERG
ZUKUNFT
SEIT 1386

IWR COLLOQUIUM SUMMER SEMESTER 2025

Prof. Kirk M. Soodhalter

The University of Dublin, Ireland • 2024 Romberg Visiting Professor

A “Super-Krylov” Approach to Diagonalization on a Quantum Computer

In this talk, we discuss our first steps in exploring the adaption of Krylov subspace approaches to the quantum computing setting. The problem we consider is the estimation of the ground state eigenvalue of a Hamiltonian matrix (i.e., the left-most eigenvalue of a Hermitian matrix). This setting presents a number of challenges, including that we can only work with specifically prepared unitary matrices. We overcome these challenges by constructing a specific “super Krylov” subspace using a unitary matrix and using a hybrid quantum-classical approach to take advantage of the strengths of both computational settings. Theoretical analysis and practical numerical results demonstrate the utility of this approach.

**Also streamed
via Zoom**



May 15, 2025 • 16:15

Mathematikon • Conference Room / 5th Floor

Im Neuenheimer Feld 205 • 69120 Heidelberg

<https://web.iwr.uni-heidelberg.de/events/iwr-colloquium.html>

HGS MathComp Mixer

Prior to the IWR-Colloquium: Get-together for all members of the HGS MathComp

15:45 • Mathematikon • Common Room / 5th Floor