



Open Project (MA, Hiwi)

Robust MPC for quantum systems

<p>Description:</p> <p>Quantum computers promise to revolutionize computing by efficiently solving previously intractable problems. Recent years have seen tremendous progress on the experimental realization of quantum computing. However, current devices are affected by noise which severely limits the size of algorithms that can be implemented.</p> <p>Building a quantum computer requires the solution of optimal control problems for the <i>Schrödinger equation</i> $i\frac{d}{dt}\psi(t) = (H_0 + H_1u(t))\psi(t)$ with state $\psi(t)$ and input $u(t)$. The bilinearity of these dynamics as well as uncertainties commonly encountered in quantum physics pose key challenges to efficiently and accurately solve this quantum optimal control problem.</p> <p>The goal of this project is to apply advanced methods from model predictive control (MPC) to control quantum systems. In particular, robust MPC methods should be employed to control quantum systems robustly against relevant error classes, thereby contributing to reliable quantum computing implementations in the near term.</p> <p>Prerequisites:</p> <ul style="list-style-type: none">• Strong background in control theory and mathematics• Prior knowledge in quantum systems not necessary• Lectures: <i>Model Predictive Control</i> will be beneficial	<p>Supervisor:</p> <p>Julian Berberich Room 2.235</p>
	<p>Area:</p> <p>MPC Quantum systems</p>
	<p>Properties:</p> <p>Type: MA, Hiwi</p> <p>30% literature 50% theory 20% implementation</p>
	<p>Beginning:</p> <p>now</p>

Weitere Informationen: www.ist.uni-stuttgart.de/lehre/bama

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