

Abstract Submitted  
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**Fast Quantum Control of Trapped  $^{87}\text{Rb}$  Bose-Einstein Condensates**<sup>1</sup> DENUWAN VITHANAGE, E. CARLO SAMSON, Miami University — We present numerical simulations to manipulate Bose-Einstein condensates (BECs) in a fast rate, while maintaining the coherence properties of its initial quantum state. Specifically, the objective is to quickly transport a trapped BEC along a specific distance in a short amount of time using painted potentials. We are using shortcuts-to-adiabaticity (STA) to keep high fidelity while high-speed transport occurs. 2D simulations of BEC transport are achieved by numerically solving the Gross-Pitaevskii equation (GPE) using a split-step Fourier method. With these simulations, we compared different spatial displacements that a BEC can travel while keeping high quantum fidelity using experimentally feasible parameters.

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Denuwan Vithanage  
Miami University

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