

Abstract Submitted  
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**Demonstration of a c-not gate using electromagnetically induced transparency**<sup>1</sup> KATIE MCDONNELL, LINDSEY KEARY, JONATHAN PRITCHARD<sup>2</sup>, University of Strathclyde — We present recent results demonstrating a controlled-NOT gate based on electromagnetically induced transparency (EIT), originally proposed by Müller *et al.*. The scheme relies on the strong long-range interactions between Rydberg atoms which, through Rydberg blockade, facilitates conditional transfer between target atomic qubits dependent on the initial state of a control atom. We have achieved a gate fidelity  $F \geq 0.82$  and have demonstrated Bell state entanglement by measuring parity oscillations. This method has the potential to be scaled to multiple qubits gates without a change in pulse area providing a route to create useful entangled states for high-precision measurements beyond the standard quantum limit without error correction.

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