Implementing Quantum Random Walk on Entangled States Using the IBM Quantum Computer

David Myung

Supporting Information

Figure S1. Created on Excalidraw. This figure represents a maximally entangled two-qubit state.
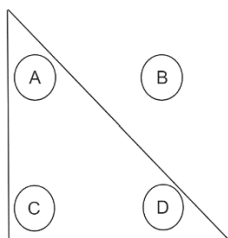

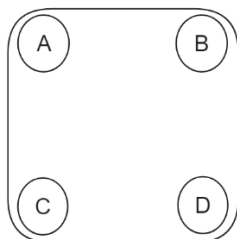**Figure S2.** Created on Excalidraw. This figure represents a maximally entangled three-qubit state.

Figure S3. Created on Excalidraw. This figure represents a maximally entangled four-qubit state.
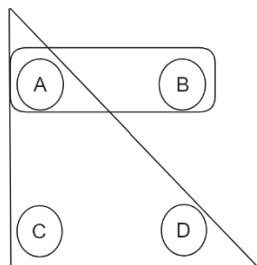

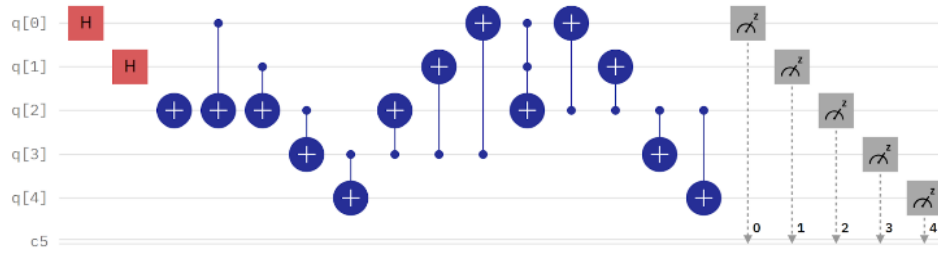**Figure S4.** Created on Excalidraw. This figure represents a partially entangled state.

Figure S5. Quantum circuit created on IBM Quantum Composer for the state $\frac{|10000> + |01000> + |00100> + |00011>}{\sqrt{2}}$.
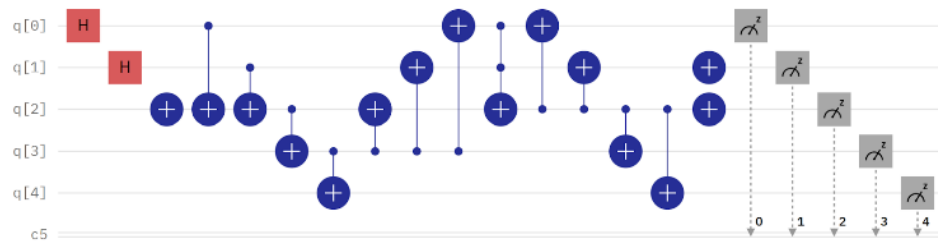

Figure S6. Quantum circuit created on IBM Quantum Composer for the state of Figure S5 with an addition of two NOT gates on the second and third qubit.
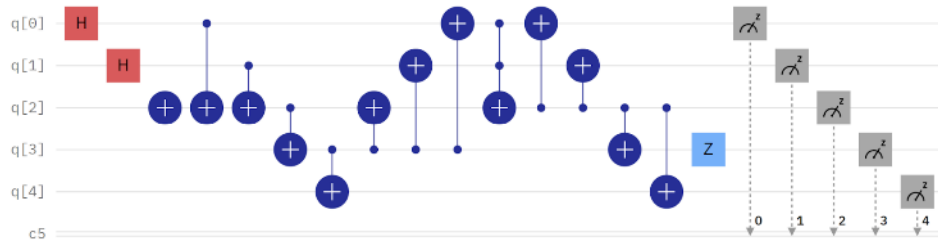

Figure S7. Quantum circuit created on IBM Quantum Composer for the state of Figure S5 with an addition of a Z gate on the fourth qubit.
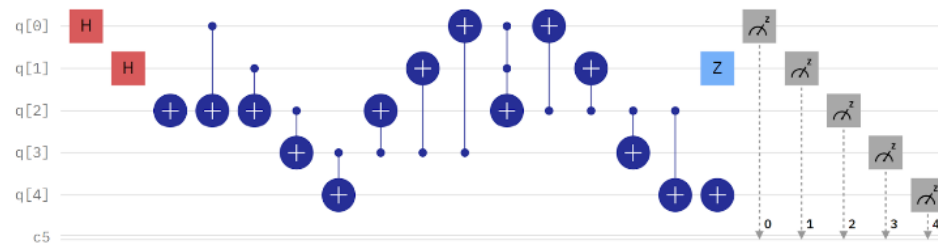

Figure S8. Quantum circuit created on IBM Quantum Composer for the state of Figure S5 with an addition of a Z gate on the second qubit and a NOT gate on the fifth qubit.
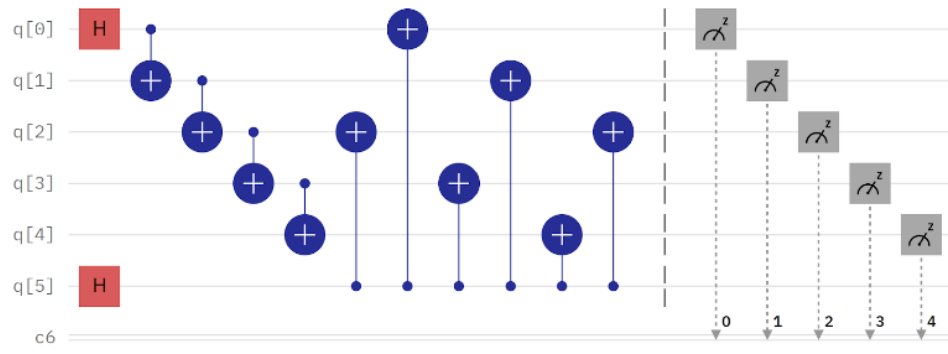
Figure S9. A quantum random walk circuit created on IBM Quantum Composer, which displayed the highest output for basis state |11011>.
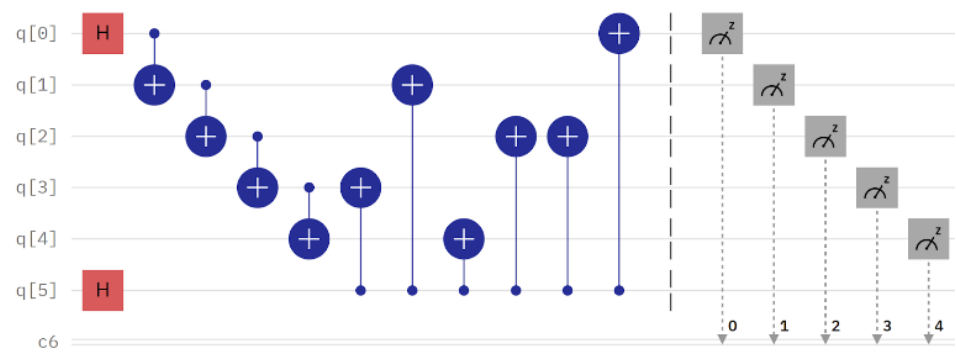

Figure S10. A quantum random walk circuit created on IBM Quantum Composer, which displayed the highest output for basis state |00100>.