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Experimental study of Spontaneous Emission in the Quantum Walk JERRY CLARK, GIL SUMMY, YINGMEI LIU, Oklahoma State University-Stillwater, SANDRO WIMBERGER, Heidelberg University — We have recently realized a quantum walk of a Bose-Einstein Condensate (BEC) of Rubidium 87 atoms by applying a periodic kicking potential to change the momentum state of the atoms and using microwave pulses to control the internal state. This periodic potential was generated by two counter-propagating, off-resonant frequency stabilized laser beams. This setup is stable to generate a quantum walk for tens of steps, however, it is affected by spontaneous emission induced by the same laser beams used to generate the kicking potential. We have investigated this spontaneous emission by varying a few parameters including the power of the kicking laser beams. The results of this study allow us to determine the robustness of the quantum walk during the experiment. These findings can also be used in other related experiments involving the use of BECs as a basis.

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