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Patterns in Photon Emission Preceding Quantum Jumps in a Trapped Ion System SARAH EDWARDS, University of California, Davis, LIUDMILA ZHUKAS, JENNIFER LILIEHOLM, BORIS BLINOV, University of Washington — The exact nature of quantum jumps, the transitions of a quantum particle between discrete energy states, is still largely a mystery. Under classical quantum mechanics, a quantum jump is both instantaneous and unpredictable, but new evidence has emerged in recent years that this may not actually be the case. If this is true, it could have far-reaching implications, both theoretical and practical. For example, if spontaneous quantum jumps are proven to be predictable, they could logically be interfered with or prevented, providing those who work in quantum information or atomic physics a way to extend coherence times by preventing transitions before they happen. The experiment presented here investigates claims that quantum jumps may be continuous rather than instantaneous by searching for changes in photon emission rate before quantum jumps in an optically driven trapped ion system.

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