

Abstract Submitted  
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**Ultrafast dynamics of photoexcited 5f electrons in the Mott insulator  $\text{UO}_2$**  YONG AN, ANTOINETTE TAYLOR, MPA-CINT, Los Alamos National Laboratory, Los Alamos, NM 87545, TOMASZ DURAKIEWICZ, MPA-CMMS, Los Alamos National Laboratory, Los Alamos, NM 87545, GEORGE RODRIGUEZ, MPA-CINT, Los Alamos National Laboratory, Los Alamos, NM 87545 — The electronic structure of Mott insulators attracts considerable attention in modern physics. Cubic structured  $\text{UO}_2$  is a model system for understanding electronics in Mott insulators with strongly correlated 5f electrons. We have performed ultrafast optical studies of carrier dynamics related to the Mott gap and its Hubbard bands with femtosecond pump-probe transient reflection measurements. Either fundamental (at wavelength 800 nm) or its second-harmonic pulses are used as the pump for below and above bandgap excitation, respectively. Measurements are extended to below Neel temperature to probe magnetic transition related dynamics. It is found that at low temperatures photoexcited 5f electrons in the upper Hubbard band have a life-time of  $\sim 4 \mu\text{s}$ , and those inside the Mott gap  $\sim 0.3 \text{ ns}$ . A long lived coherent phonon at frequency  $\sim 29 \text{ GHz}$  is observed when excited by the second-harmonic pump. It appears that the dynamics of photoexcited 5f electrons in  $\text{UO}_2$  involves exchange interaction with the phonon.

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