Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

A $\Gamma_5$ composite density wave model for the hidden order of URu$_2$Si$_2$\textsuperscript{1} PIERS COLEMAN, PREMALA CHANDRA, Rutgers University, REBECCA FLINT, Massachusetts Institute of Technology — Motivated by recent experiments on URu$_2$Si$_2$[1-4], we propose a theory for the hidden order in this material in which the hidden order parameter is a composite density wave formed formed between conduction electrons and a $\Gamma_5$ 5f$^2$ doublet. In this theory, two-channel quadrupole fluctuations in the Gamma$_5$ proceed via virtual fluctuations into a 5f$^1$ Kramer’s doublet with $\Gamma_7$ symmetry. Hybridization in these two channels is described by a Schwinger boson which condenses in both the hidden order and the magnetic phase. In the magnetic phase, the hybridization develops in the up or down channels, whereas in the hidden order phase, it develops with equal amplitude in both channels. Our theory can account for the development of an anomalous $\Delta_{xy}$ as a consequence of the composite order. It also predicts the formation of a tiny orbital moment aligned along the xy axis in the basal plane of the crystal that should be observable in neutron scattering experiments.

\textsuperscript{1}Work supported by DOE grant DE-FG02-99ER45790 (PC) and the Simons (RF).