Measurement of the electron shake-off in the $\beta$-decay of laser-trapped $^6$He atoms$^1$ RAN HONG, YELENA BAGDASAROVA, ALEJANDRO GARCIA, DEREK STORM, MATTHEW STERNBERG, ERIK SWANSON, FREDERIK WAUTERS, DAVID ZUMWALT, Department of Physics, University of Washington, KEVIN BAILEY, ARNAUD LEREDDE, PETER MUELLER, THOMAS OCONNOR, Physics Division, Argonne National Laboratory, XAVIER FLECHARD, ETIENNE LIENNARD, Laboratoire de Physique Corpusculaire, ANDREAS KNECHT, Paul Scherrer Institute, OSCAR NAVILIAT-CUNCIC, National Superconducting Cyclotron Laboratory, Michigan State University — Electron shake-off is an important process in many high precision nuclear $\beta$-decay measurements searching for physics beyond the standard model. $^6$He being one of the lightest $\beta$-decaying isotopes, has a simple atomic structure. Thus, it is well suited for testing calculations of shake-off effects. Shake-off probabilities from the $2^3S_1$ and $2^3P_2$ initial states of laser trapped $^6$He matter for the on-going beta-neutrino correlation study at the University of Washington. These probabilities are obtained by analyzing the time-of-flight distribution of the recoil ions detected in coincidence with the beta particles. A $\beta$-neutrino correlation independent analysis approach was developed. The measured upper limit of the double shake-off probability is $2 \times 10^{-4}$ at 90% confidence level. This result is $\sim$100 times lower than the most recent calculation by Schulhoff and Drake$^2$.

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Ran Hong
Department of Physics, University of Washington

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