Excitation-ionization processes in K-shell vacancy production in Li by fast bare oxygen ions: doubly-differential cross sections\textsuperscript{1} M.D. ŚPIEWANOWSKI, York University, L. GULYAS, Institute for Nuclear Research, Hungarian Academy of Sciences (ATOMKI), M. HORBATSCH, T. KIRCHNER, York University — Recent theoretical work has demonstrated that K-shell vacancy production in Li by 1.5 MeV/amu O\textsuperscript{8+} impact cannot be understood as a simple one-electron process. Rather, a certain two-electron excitation-ionization process, in which the valence electron is removed, while one of the K-shell electrons makes a transition to an excited state, was found to give the dominant contribution to the singly-differential cross section at low to intermediate energies of the outgoing electron \cite{Kirchner2014}. In this work, we extend the calculations to the doubly-differential level and present cross sections which are differential in the electron energy and the transverse momentum transfer \cite{Spiewanowski2016}. The calculation involves the combination of impact-parameter-dependent single-electron amplitudes and a two-dimensional Fourier transformation of the resulting multielectron amplitudes to obtain momentum-transfer-dependent transition matrix elements. Results are found to be in good agreement with recent measurements, especially at low outgoing electron energy, and underline the importance of two-electron excitation ionization in this collision system.\cite{Kirchner2014, Spiewanowski2016}

\textsuperscript{1}Work supported by NSERC, Canada and the Hungarian Scientific Research Fund.

Tom Kirchner
York University

Date submitted: 28 Jan 2016 Electronic form version 1.4