Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Vortices in Coulomb-Born calculations for inner-shell ionization of carbon by electron-impact[1] S.J. WARD, University of North Texas, J.H. MACEK, University of Tennessee — The deep minimum in the He(e,2e)He^+ measured TDCS [1] have been traced to vortices in the continuum wave function [2]. Using the Coulomb-Born approximation [3], we show that vortices are also present in inner-shell ionization of carbon by electron impact. We considered the energy of the incident electron to be $E_i = 1801.2$ eV and the scattering angle to be $\theta_f = 4^\circ$. We located a vortex when the momentum of the electron $\mathbf{k}$ is (-0.547,0,-0.326), where the z-axis is taken along the incident momentum $\mathbf{K}_i$ and the x-axis is in the plane of the incident and scattered electrons. At this $\mathbf{k}$, both $\Re$[T-matrix] and $\Im$[T-matrix] are zero. The integral of the velocity field around a closed loop encircling the zero of the T-matrix is 2π as is required for a vortex. We also located vortices for out-of-plane geometries (k_y non-zero) for $\theta_f = 4^\circ$ and also in-plane for different scattering angles. Obtaining vortices in the Coulomb-Born approximation is important since they effect the electron momentum distribution and the approximation gives for *fixed scattering angles* the high-energy limit for electron-impact inner-shell ionization. [1] A. J. Murray and F. H. Read, PRA **47**, 3724 (1993). [2] J. H. Macek et. al, PRL **104**, 033201 (2010). [3] J. Botero and J. H. Macek, PRA **45**, 154 (1992).

[1]S.J.W. acknowledges support from NSF under grant no. PHYS-968638

S.J. Ward
University of North Texas

Date submitted: 02 Mar 2011 Electronic form version 1.4