Abstract Submitted
for the OSS21 Meeting of
The American Physical Society

Projectile Momentum Uncertainty Effects in Electron Vortex Beam Collisions[1] ALEXANDER PLUMADORE, ALLISON HARRIS, Illinois State University — Ionization collisions have important consequences in many physical phenomena, and the mechanism that leads to ionization is not universal. Understanding how and why electrons are removed from atoms and molecules is crucial to forming a complete picture of the physics. Double differential cross sections (DDCS) have been used for decades to examine the physical mechanisms that lead to ionization and two separate pathways have been identified depending on the energy of the ionized electron. At low energies, the DDCS feature a broad distribution as a function of ionization angle, while at high energies, a sharp peak is observed in the distributions. The width of the DDCS peak can be directly traced to the target electrons quantum mechanical momentum distribution and the results are well-known for plane wave projectiles. However, the recent development of sculpted particle wave packets introduces the opportunity to re-examine the mechanisms that lead to ionization. We present DDCS for (e,2e) ionization of atomic hydrogen for electron vortex projectiles and show that for vortex projectiles making close collisions with the target, the DDCS are sensitive to the projectile momentum uncertainty.

[1]We gratefully acknowledge the support of the NSF under Grant No. PHY-1912093.

Alexander Plumadore
Illinois State University

Date submitted: 28 Mar 2021 Electronic form version 1.4