

# TWISTED IDENTITIES

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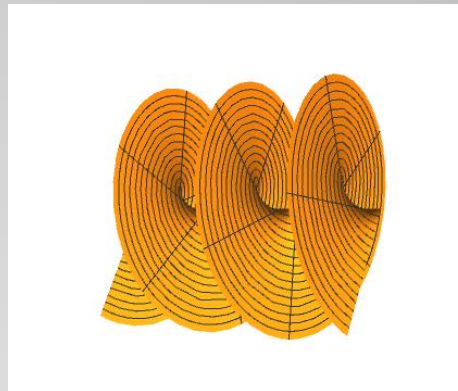
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DEPARTMENT OF PHYSICS

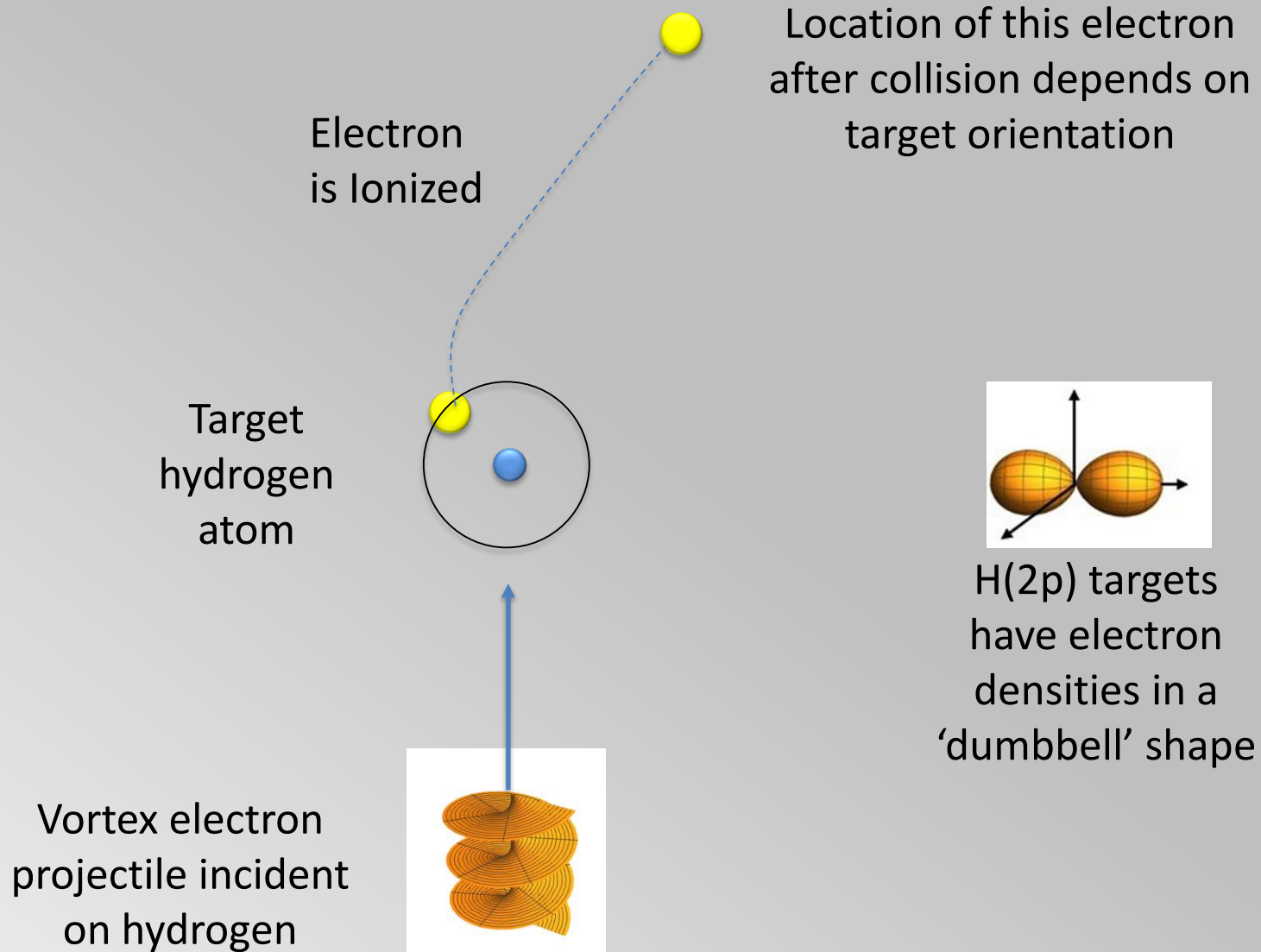


# ELECTRON VORTEX BEAM BASICS

- Electrons are matter waves with a twist as shown
  - Wave fronts have spiral shape
- Freely propagating waves and solutions to the free particle Schrödinger equation
- Non-zero orbital angular momentum and transverse linear momentum lead to interesting applications
  - Characterizing chiral molecules, controlling rotation and orientation of nanoparticles, etc.
- Experimentally created, but to realize applications, a fundamental understanding of their basic interactions with matter is needed



# ELECTRON VORTEX PROJECTILE IONIZES HYDROGEN TARGET

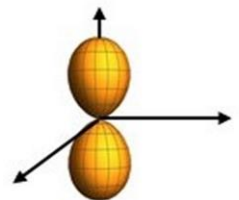
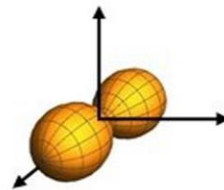
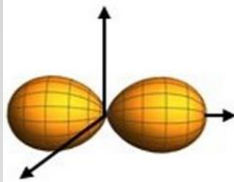
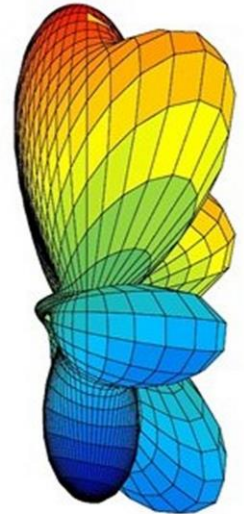
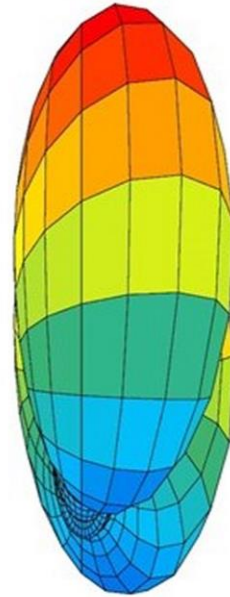
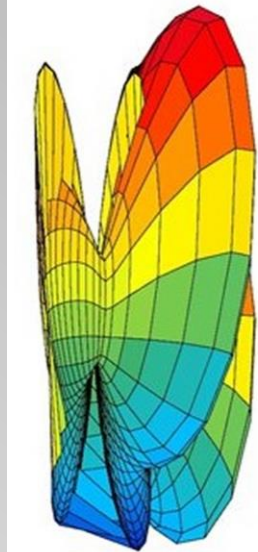


# ATOMIC ELECTRON DISTRIBUTIONS

## INDICATE INITIAL TARGET ORIENTATION

Distribution  
of atomic  
electron after  
collision

H(2p) electron  
density before  
collision



# CONCLUSIONS

- Shape of the post-collision atomic electron distribution similar to pre-collision atomic electron density
- These distributions may be used to determine the target's initial state orientation
- These early results are encouraging for future studies with molecular targets that have well-defined nuclear structure and orientation
- Electron vortex projectiles show promise for possible control of molecular orientation

