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Under the Barrier Wave Packet Tunneling Dynamics[1] ALLISON HARRIS, TORREY SAXTON, GLENN DUSING, Illinois State University — Recent experimental work has succeeded in producing electron wave packets with non-traditional spatial profiles. These include wave packets in the shape of an Airy function, which are minimally dispersive, exhibit force-free acceleration, and can self-heal. Optical Airy beams have been studied since their discovery in the late 1970s and have found numerous applications in technologies such as microscopy and optical trapping. However, the dynamics of matter Airy beams is not fully understood. An interesting feature of the Airy wave packet is that its momentum density, like that of a Gaussian wave packet, is Gaussian. This provides an opportunity to compare the dynamics of wave packets with the same momentum density, but different spatial profiles. We use our Path Integral Quantum Trajectory (PIQTr) model to present a time-dependent theoretical study of tunneling, reflection, and transmission of Airy wave packets. We show that the dynamics of tunneling for the two types of wave packets is significantly different. In particular, the tunneling of the Airy beam is delayed compared to the Gaussian wave packet, and the probability density under the barrier during tunneling exhibits different dynamics

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