

Abstract Submitted
for the SES05 Meeting of
The American Physical Society

What is a Particle in Classical Physics? A Wave?¹ RONALD E. MICKENS, Clark Atlanta University — The concepts of “particle” and “wave” play important roles in quantum mechanics in that a given microscopic system can, under the proper circumstances, display properties of each.² However, these categories have their genesis in classical mechanics³ and we must turn to this area to understand what they mean. In particular, it must be clearly understood that these concepts are idealistic representations of physical phenomena and, as a consequence, each may not correspond to any actual physical system. We discuss the definition of “particle” from the perspective of how it has been defined in standard textbooks and carry out a similar analysis for the notion of “wave.” We then define “particle” and “wave” within the context of classical mechanics by means of their respective equations of motion. The general (tentative) conclusion is that within the framework of classical mechanics the concepts of “particle” and “wave” systems may be unambiguously defined.

¹This work was supported in part by a DOE grant and CETL (Clark Atlanta University).

²A Messiah, Quantum Mechanics, Vols. I and II (Wiley, 1961).

³H. Goldstein, Classical Mechanics (Addison-Wesley, 1980, 2nd edition).

Ronald E. Mickens
Clark Atlanta University

Date submitted: 04 Aug 2005

Electronic form version 1.4