

# A NEW EXPLANATION OF THE EXTINCTION PARADOX. PART I.

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ABSTRACT. This work presents a new explanation for the extinction paradox and shows that the canonical explanations are incorrect. The paradox refers to the large size limit of a particle's extinction cross section. It is called a paradox because the geometrical optics approximation, which should be valid in this limit, predicts a cross section that is half of the true value. The new explanation, developed here and continued in Part II, is achieved by formulating the scattered wave in terms of an integral over the particle's surface where the seemingly unrelated Ewald-Oseen theorem appears in the formulation. By expressing the cross section in terms of this surface integral, the Ewald-Oseen theorem is analytically connected to the cross section. Several illustrations are used to study this connection. Part II of this work unifies the results of Part I under a common interpretation where the full significance of the new explanation emerges. All in all, this work constitutes a fundamental reworking of sixty years of accepted understanding for the cause of the asymptotic behavior of the extinction cross section.