

# Physics Department Seminar

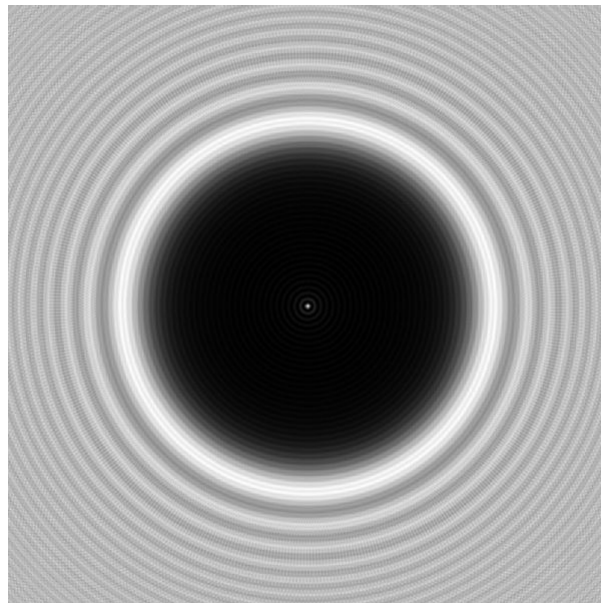
Friday May 11th, 2012

11:00 am in PhSc 105

## Fresnel Diffraction and the Mysterious Poisson Spot

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**Abstract:** The optical phenomenon of diffraction is usually classified as either Fraunhofer or Fresnel. The Fraunhofer case, or far-field approximation, is the simpler of the two and is the type of analysis that is typically done in the introductory physics sequence. In this talk I will contrast the Fraunhofer approximation with the more general Fresnel formulation, which enables us to correctly predict the behavior of electromagnetic waves in the near-field regime. Using the secondary wavelet theory of Fresnel and Huygens, in combination with a geometric analysis based on so-called half period zones, we can obtain several non-intuitive results. The most famous example of such behavior is the Poisson Spot: a bright spot at the center of a shadow cast by an opaque circular barrier.