QPhysics
AT QUEENS COLLEGE

Colloquium Notice

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What is a laser, and do we really understand them after forty-five years

Recently invented micro and nano lasers have challenged our understanding of lasers and revealed the absence of a predictive theory. Perhaps most surprising is the existence of random lasers, based on multiple scattering between nanoparticles in the presence of gain. While these lasers behave in most respects like conventional lasers in terms of their emission properties, they have no mirrors or cavity of any kind. and the linear scattering spectrum reveals no long-lived resonances to support lasing. In the absence of long-lived cavity resonances conventional semiclassical laser theory, which assumes such resonances evolve into the laser modes, has no starting point. Recently, we have developed a modern formulation of semiclassical laser theory, which elucidates the nature of lasing modes in cavities of arbitrary complexity and arbitrary leakiness, including the case of random lasers. The theory also treats the strong non-linear interaction between lasing modes to all orders and has been shown to agree with full numerical solutions of the lasing equations with no adjustable parameters. Thus we are in position to understand qualitatively complex and random lasers and in the near future produce a truly predictive theory for many lasers of applied and fundamental interest.

Monday
November 23, 2009
Starts at 12:15 PM
Coffee at 12:00 PM
Physics Conference Room, SB B326