

سمینار هفتگی گروه اطلاعات کوانتومی

سه‌شنبه ۱۳۹۴/۷/۱۴، ساعت ۱۵:۰۰، اتاق شورای دانشکده‌ی فیزیک

Time-Independent Scattering Theory as a Dynamical Phenomenon, Unidirectional Invisibility, and Local Inverse Scattering

Ali Mostafazadeh
Department of Mathematics,
Koc University, Turkey

Abstract

This talk aims at presenting a general introduction to the basic motivations and ideas responsible for the recent progress on the old subject of scattering theory of complex potentials. It begins with a quick review of pseudo-Hermitian representation of quantum mechanics, discusses the phenomena of spectral singularity and unidirectional invisibility, shows that the transfer matrix of scattering theory is the S-matrix of a non-unitary two level system, outlines a novel dynamical formulation of scattering theory, and describes its applications in perturbative and semiclassical scattering, and inverse scattering. A surprising outcome of this approach to scattering theory is the discovery of a previously unnoticed manifestation of geometric phases as the pre-exponential factor in the WKB wave functions. The talk ends with a discussion of a simple inverse scattering prescription that allows for an explicit construction of a scattering potential with desired scattering properties at any given wavelength and has interesting practical applications in optics such as designing unidirectional or bidirectional amplifiers, absorbers, phase shifters, lasers, antilasers, and even invisibility cloaks.