Institute of Atomic Physics, Institute of Physics and Nuclear Engineering, Theoretical Physics

SEMINAR

Extensive Light Investigations
Seminars V

Scattering of Heavy Ions in Strong Laser Fields

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The nucleus-nucleus potential scattering in a laser field is investigated within the Kroll-Watson theorem, which aserts that the differential cross-section for *n* emitted or absorbed photons during the collision can be expressed as a product between the field-free value and the square of the Bessel function of order *n* with its argument containing the effect of the laser in a non-perturbational way.

I report a very recent investigation (in collaboration with F. Carstoiu) on the dependence of the *n*-photon differential cross-section on the intensity, photon energy, shape and duration of the pulse for a projectile/target combination at a fixed collision energy, which exhibits a superposition of Fraunhofer and refractive behavior.

The role of the electromagnetic field on the near and farside components in the angular distribution is discussed for the first time in the context of the nuclear elastic scattering. As a study case we consider the elastic scattering of ^{4}He on ^{58}Ni at laboratory energy E=139 MeV and calculate the field-free cross-section via a standard optical model analysis which provides an excellent description of the measured data.

The *n*-photon contributions to the cross-section for linear polarized continuous-wave and modulated laser pulses are determined for a wide range of intensities. This analysis reveals that for intensities approaching $I=10^{17}$ W/cm^2 multiphoton effects become important.

We also report how the functional form of the pulse shape and pulse duration modifies the multi-photon strengths.

Thursday, February 22th, 2018, 12 am,
Seminar Room, Department of Theoretical Physics