

DIRECT REACTION THEORIES FOR EXOTIC NUCLEI

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The talk will start with a very brief introduction on the historical development of the concept of direct reactions as complementary to compound nucleus reactions and with a short review of the great achievements of both experiments and theories in the 70's and 80's with "normal" heavy ions.

Exotic nuclei are characterized by anomalous N/Z ratios and very weak binding of their valence nucleons. From mid 80's, beams of such nuclei have been available for structure studies and the reaction cross sections are dominated by direct reactions due to the relevance of surface degrees of freedom. Thus both experiments and direct reaction theories have found their best flourishing ground with such nuclei and new, very intriguing characteristics of otherwise well known reaction mechanisms have emerged with "extreme" features.

I will discuss elastic scattering, inelastic excitations, transfer and breakup and the fundamental role the concept of optical potential plays in the theoretical description of all of them. Simple semiclassical models will be stressed for their transparent physical interpretation of the reaction mechanisms. Results of calculations and comparison to experimental data for the extraction of structure information will be shown in a few selected cases.

As a result of thirty years of studies of exotic nuclei, direct reactions and their interplay with other mechanisms have helped clarifying many phenomenological models of the nucleus and they have shown the path towards more ab-initio and fully quantum mechanical theories of both nuclear structure and nuclear dynamics.