SES10-2010-000032

Abstract for an Invited Paper for the SES10 Meeting of the American Physical Society

Nuclear many-body problem, from reactions to structure¹ ALEXANDER VOLYA, Florida State University

Structure and reaction aspects, while usually discussed separately, are deeply entangled in the nuclear many-body systems. In this presentation we highlight the advances, as well as difficulties in the path toward building a unified approach. For model studies of reactions involving composite objects, we obtain exact solutions with the newly developed Variable Phase Method. We demonstrate some non-trivial aspects of the dynamics projected onto the intrinsic Shell Model space. We discuss the limitations of the projection methods as well as convergence properties of the solutions. We present the Time Dependent Continuum Shell Model (TDCSM) and demonstrate its application to realistic nuclear problem. In the case of ⁸B the observation of the ⁷Be(p,p') cross section, its angular dependence, and interference between resonances allows one to make in-depth conclusions about the many-body structure using TDCSM. We find that virtual excitations are important. Behavior of the spectroscopic amplitudes, and changes in the collective dynamics due to the presence of reaction continuum will be discussed.

¹This work is supported by the U. S. Department of Energy grant DE-FG02-92ER40750.