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Some recent trends in nuclear reaction theory for basic science and applications

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In recent times, it has become commonplace to mention the unification of structure and reaction nuclear theory as one of the hot topics in low-energy nuclear physics. This interest is, of course, not new, but some present circumstances might have made it more acute. First, the experimental access to very weakly bound or unbound nuclei has blurred the limits between structure and reaction theory. Second, the fast development of computational tools and resources has rendered scattering problems tractable with bound states techniques. We will also address some ideas in the path to another important unification: the theory of direct and compound nucleus reactions. This line of research is important in order to address important processes, such as capture reactions, involving nuclei away from the stability valley, where an unusually low level density calls for the description of a transition between the statistical and direct reaction regimes.

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