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Ab initio reactions for X-ray burst nucleosynthesis[1] ALEXIS MERCENNE, KRISTINA LAUNEY, Louisiana State University, TOMAS DYTRYCH, Academy of Sciences of the Czech Republic, JUTTA ESCHER, Lawrence Livermore National Laboratory, JERRY DRAAYER, Louisiana State University — We present the latest results of the symmetry-adapted resonating group method (SA-RGM), a microscopic *ab initio* approach for nuclear reactions for light to medium-mass nuclei. It builds upon the *ab initio* RGM framework, but in addition, the internal cluster wave functions are calculated using the symmetry-adapted no-core shell model. It takes advantage of group theoretical methods, such as SU(3) and symplectic symmetries, to reorganize and reduce the dimensionality of the model space, consequently making solutions for heavier nuclei feasible. The SU(3) algebra is suited for RGM-type calculations as well, since it naturally takes antisymmetry and cluster correlations into account. In this presentation, I will discuss the SA-RGM formulation and its applications to nuclear reactions for intermediate-mass nuclei from an *ab initio* perspective. This will be illustrated with the latest results on phase shifts for single nucleon projectile on ^{4}He, ^{16}O and ^{20}Ne targets, as well as a study of the nucleon radiative capture on ^{23}Al of significance to astrophysics.

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