

# ***Ab initio* calculations of ${}^3\text{H}(d,n){}^4\text{He}$ fusion\***

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We build a new *ab initio* many-body approach [1] capable of describing simultaneously both bound and scattering states in light nuclei, by combining the resonating-group method [2] with the *ab initio* no-core shell model [3]. In this way, we complement a microscopic-cluster technique with the use of realistic interactions, and a microscopic and consistent description of the nucleon clusters. We will present the first results of the  $d$ - ${}^3\text{H}$  and  $d$ - ${}^3\text{He}$  fusion calculation obtained within our *ab initio* approach. We will also discuss our  $d$ - ${}^4\text{He}$ ,  ${}^3\text{H}$ - ${}^4\text{He}$  and  ${}^3\text{H}$ - ${}^3\text{H}$  scattering calculations and the outline of the extension of the formalism to include three-cluster final states with the goal to calculate the  ${}^3\text{H}({}^3\text{H},2n){}^4\text{He}$  cross section.

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