

Abstract Submitted
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S-factors of capture reactions important for astrophysics from *ab initio* wave functions¹ PETR NAVRATIL, CHRISTIAN FORSSEN, ERICH ORMAND, Lawrence Livermore National Laboratory, CARLOS BERTULANI, University of Arizona, ETIENNE CAURIER, IRES CNRS Strasbourg — Nuclear structure of ^3He , ^4He , ^7Be , ^8B , ^{10}Be and ^{11}Be is studied within the *ab initio* no-core shell model (NCSM). Starting from realistic inter-nucleon interactions, wave functions for these nuclei are obtained in basis spaces up to $12\hbar\Omega$ and then used to calculate cluster form factors (overlap functions) for the bound states of ^8B with $^7\text{Be}+p$, ^7Be with $^3\text{He}+^4\text{He}$ and ^{11}Be with $^{10}\text{Be}+n$ as a function of the separation between the two interacting clusters. Due to the use of the harmonic oscillator basis, the overlap functions have incorrect asymptotics. To fix this problem, we perform a least-square fit of Woods-Saxon potential solutions to the NCSM overlap functions in the range from 0 fm up to about 4 fm under the constraint that the experimental separation energy is reproduced. The corrected overlap functions are then used for the $^7\text{Be}(p,\gamma)^8\text{B}$, $^3\text{He}(\alpha,\gamma)^7\text{Be}$ and $^{10}\text{Be}(n,\gamma)^{11}\text{Be}$ S-factor calculations. Support from the LDRD contract No. 04-ERD-058 as well as partial support from the DOE grants SCW0498 and DE-FG02-04ER41338 is acknowledged.

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