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Breakup of loosely bound nuclei as indirect method in nuclear astrophysics: ^{8}B, ^{9}C, ^{15}C, ^{23}Al L. TRACHE, C.A. GAGLIARDI, R.E. TRIBBLE, Texas A&M University, College Station, TX, F. CARSTOIU, NIPNE Bucharest, Romania — We discuss the use of one-nucleon breakup reactions of loosely bound nuclei at intermediate energies as an indirect method in nuclear astrophysics. These are peripheral processes, therefore we can extract asymptotic normalization coefficients (ANC) from which astrophysical S-factors and rates for radiative proton capture reactions can be precisely determined. In particular, the breakup of ^{8}B and ^{9}C is described in terms of an extended Glauber model. Existing experimental data for the breakup of ^{8}B and of ^{9}C on light through heavy targets are analyzed. We show that there exists a favorable kinematical window in which breakup reactions are highly peripheral. In this regime the ANC is the better spectroscopic information to be extracted. Glauber model calculations in the eikonal approximation and the optical limit using different effective interactions give consistent, though slightly different results. This shows the possibilities and the limits of the precision of the method. Breakup reactions can be measured with radioactive beams as weak as a few particle per second, and can be used for cases where no direct measurements or other indirect methods for nuclear astrophysics can be applied. We discuss also the use of one-neutron-removal to assess (n,γ) rates using ^{15}C as example, and the proposed use of the breakup of proton drip line nucleus ^{23}Al to obtain the stellar reaction rate for ^{22}Mg(p,γ)^{23}Al.

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