

# Theory advances in reactions relevant for astrophysics

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Indirect reaction techniques is very important in astrophysics as they provide information that are complementary to direct measurements or that otherwise cannot be obtained directly. It is then critical to have a reliable reaction theory that can connect the reaction measurement with the astrophysical information desired. This is a brief report on the progress made in the theory for transfer reactions when used to determine neutron capture rates for r-process and rp-process nuclei. We first discuss the different types of experiments and their connection to astrophysics. An overview of the current status of the theory will be provided, with emphasis on several recent theory developments, including transfer to continuum, the improvement of the optical potential and uncertainty quantification. Applications to a couple of neutron rich and proton rich cases will be discussed.