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Séminaire de Physique Nucléaire Théorique

Nuclear reaction rates as a key ingredient of stellar modelling : The case of the C12+C12 fusion reaction

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The origin of elements as well as their abundance in the Universe and among stars is at the heart of astrophysics today. Since the Big Bang, chemicals abundances are continuously evolving due to the nucleosynthesis involving different processes with mainly nuclear fusion or particle capture and the subsequent reactions. These processes are taking place in a variety of astrophysical sites, from stars to supernovae and merging events. Stellar evolution codes have been developed to describe the evolution and structure of stars using different physical input ingredients. In particular, the precise determination of the nuclear reaction rates, that drive the stellar evolution, is a crucial ingredient in understanding chemical evolution. Recently, new nuclear reaction rates have been determined for the different stellar evolution phases by nuclear experiments, potentially leading to significant changes in the nucleosynthesis predictions, with consequences on light and s-process elements abundances. In order to improve stellar modeling, we now need to take into account these new results that can bring one of the key to better constrain stellar evolution and better understand the chemically peculiar stars. Especially I focus on the C12+C12 nuclear reaction that takes place during the C-burning phase of massive stars (¿ 8Msol) and for which new measurements have been obtained recently by the IPHC-STELLA team of Strasbourg.

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