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Nuclear Astrophysics with Gamma-ray Beams

ERNST REHM, Argonne National Laboratory

Experiments with γ -ray beams have opened many new opportunities in nuclear astrophysics. They include studies of photonuclear (γ, p) , (γ, n) and (γ, α) reactions which play an important role in the large γ -ray flux during stellar explosions. Furthermore (α, γ) captures can be investigated through their time-inverse (γ, α) reactions with much thicker targets and, thus, increased luminosities. I will discuss the experimental program in nuclear astrophysics at HI γ S, with particular emphasis on the present status and future plans of the $^{12}\text{C}(\alpha, \gamma)^{16}\text{O}$ reaction studies. This work was supported by the US Department of Energy, Office of Nuclear Physics, under contract DE-AC02-06CH11357.