

Gamma-ray emission in alpha-particle reactions with C, Mg, Si, Fe

J. Kiener, J. Bundesmann, I. Deloncle, A. Denker, A. Gostojic, C. Hamadache, J. Röhrich, V. Tatischeff, H. Benhabiles, A. Coc, F. Hammache, R. Mezhoud, J. Peyré

The gamma-ray emission in alpha-particle reactions with C, Mg, Si and Fe has been measured in two experiments at the cyclotron of the Helmholtz-Zentrum Berlin, employing several HP-Ge and LaBr₃ detectors. Cross sections for a good dozen gamma-ray lines for each target could be determined in the alpha-particle energy range $E_\alpha = 50\text{-}90$ MeV. They were compared to previous measurements, a cross-section compilation and nuclear reaction calculations with the code Talys. Additionally, preliminary line-shape calculations for the 4.44-MeV line of ¹²C were done and compared with measured line shapes from HP-Ge spectra. The astrophysical interest of the data will be discussed.