Cross section measurements of the Big-Bang nucleosynthesis reaction D(α,γ)^{6}Li by Coulomb Dissociation of ^{6}Li

F. Hammache[a,b], D. Galaviz[c], K. Sümmerer[a], J. Kiener[d], A. Coc[d], D. Cortina-Gil[e], F. Attallah[a], H. Geissel[a], M. Hellstrom[a], P. Koczon[a], B. Kohlmeyer[f], R. Kulessa[g], F. Schümann[h], E. Schwab[a], K. Schwarz[a], P. Senger[a], O. Sorlin[b], V. Tatischeff[c], J.P. Thibaud[c], A. Wagner[i], W. Walus[g]

[a] *GSI, Postfach 110552, D-64220 Darmstadt, Germany*
[b] *IPN, IN2P3-CNRS, 91406 Orsay, France*
[c] *Institut für Kernphysik, TU-Darmstadt, Schlossgartenstrasse 9, D-64289, Germany*
[d] *CSNSM, IN2P3-CNRS, 91405 Orsay, France*
[e] *Universidad de Santiago de Compostela, E-15706 Santiago de Compostela, Spain*
[f] *Fachbereich Physik, Philipps Universität D-3550 Marburg, Germany*
[g] *Institute of Physics, Jagiellonian University, PL-30-059 Krakow, Poland*
[h] *Ruhr-Universität Bochum Universitätsstr. 150, D-44780 Bochum, Germany*
[i] *Forschungszentrum Rossendorf, D-01314 Dresden, Germany*

Abstract

The possibility that big-bang nucleosynthesis (BBN) may produce nontrivial amounts of ^{6}Li is under study since the recent observations of this element in three old halo stars. However, the interpretation of these observations needs a precise knowledge of the reaction rate of D(α,γ)^{6}Li which, at present, is extremely uncertain (a factor of 20) at the energy of astrophysical interest ($E_{c.m} \leq$ 300 keV). This uncertainty originates from difficulties in both theoretical estimates and experimental determinations of the D(α,γ)^{6}Li capture reaction cross section.

New measurement of the cross section of D(α,γ)^{6}Li reaction using Coulomb dissociation of ^{6}Li at 150 A MeV has been performed recently at GSI. The obtained results will be presented and compared to the previous measurements and the theoretical calculations.