Determination of asymptotic normalization coefficients for the channel $^{16}O \rightarrow \alpha + ^{12}C$. II. Excited states $^{16}O(3^-, 2^+, 1^-)$

L.D. Blokhintsev A.S. Kadyrov, A.M. Mukhamedzhanov,and D.A. Savin

Asymptotic normalization coefficients (ANC) determine the overall normalization of cross sections of peripheral radiative capture reactions. In a recent paper [Blokhintsev et al., Eur. Phys. J. A 58, 257 (2022)], we considered the ANC C0 for the virtual decay $^{16}O(0^+; 6.05MeV) \rightarrow \alpha + ^{12}C(g.s.)$. In the present paper, which can be regarded as a continuation of the previous, we treat the ANCs Cl for the vertices $^{16}O(J\pi) \rightarrow \alpha + ^{12}C(g.s.)$ corresponding to the other three bound excited states of ^{16}O ($J\pi = 3^-, 2^+, 1^-, l = J$). ANCs Cl ($l = 3, 2, 1$) are found by analytic continuation in energy of the α-^{12}C l-wave partial scattering amplitudes, known from the phase-shift analysis of experimental data, to the pole corresponding to the ^{16}O bound state and lying in the unphysical region of negative energies. To determine Cl, the scattering data are approximated by the sum of polynomials in energy in the physical region and then extrapolated to the pole. For a more reliable determination of the ANCs, various forms of functions expressed in terms of phase shifts were used in analytical approximation and subsequent extrapolation.

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[1] Blokhintsev *et al.*, Eur. Phys. J. A **58**, 257 (2022).