

# Modern Problems of Nuclear and Elementary Particle Physics



The 9th APCTP – BLTP JINR Joint Workshop

Joint Institute for Nuclear Research

# Modern Problems of Nuclear and Elementary Particle Physics

*Book of Abstracts  
of the 9th APCTP–BLTP JINR Joint Workshop*

Almaty, Kazakhstan, June 27–July 4, 2015

## ALPHA CLUSTER TRANSFER IN $^{20}\text{Ne}+^{16}\text{O}$ AT ENERGY 50 MEV

M. Nassurlla<sup>1,3</sup>, N. Burtebayev<sup>1</sup>, A. Duisebayev<sup>1</sup>, I. Boztosun<sup>2</sup>, J. Burtebayeva<sup>1</sup>, A. Urkinbayev<sup>1</sup>,  
K. Rusek<sup>4</sup>, E. Piasecki<sup>4</sup>, S. Kliczewski<sup>5</sup>, A. Trzcinska<sup>4</sup>, S. B. Sakuta<sup>6</sup>, S. V. Artemov<sup>7</sup>, L.I. Galanina<sup>8</sup>

<sup>1</sup> *Institute of Nuclear Physics, Almaty, Kazakhstan*

<sup>2</sup> *Akdeniz University, Faculty of Science, Department of Physics, Antalya, Turkey*

<sup>3</sup> *Kazakh National University, Almaty, Kazakhstan*

<sup>4</sup> *Heavy Ion Laboratory of Warsaw University, Warsaw, Poland*

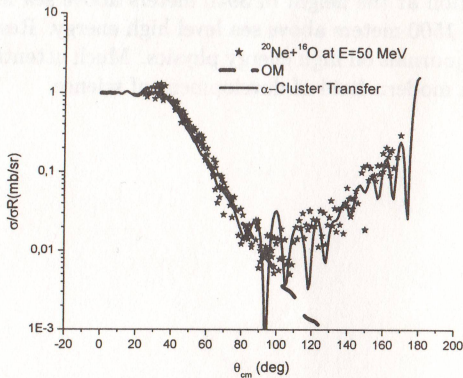
<sup>5</sup> *H. Niewodniczański Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland*

<sup>6</sup> *Russian Research Center "Kurchatov Institute", Moscow, Russia*

<sup>7</sup> *Institute of Nuclear Physics, Tashkent, Uzbekistan*

<sup>8</sup> *Skobeltsyn Institute of Nuclear Physics of Moscow State University, Moscow, Russia*

Previously, were analyzed the differential cross sections for elastic scattering of neon ions on oxygen nuclei based on experimental data of Stock et al. [1] in framework of the optical model and coupled channel method [2]. The new experiment at the heavy ion accelerator at Warsaw University was carried out with a significant expansion of the range of angles up to  $170^\circ$  in center mass system at  $E_{L,lab}=50.0$  MeV (see figure). The tendency of growth of the cross sections at backward angles was conserved. Such behavior of the cross sections for elastic scattering of heavy ions on light nuclei is typically for alpha-clustered nuclear systems. Optical model have difficulty in describing such behavior and predict the rise of differential cross section at large angles. In order to explain this structure of angular distribution we present that such increase could be interpreted due to the contribution of  $\alpha$ -cluster elastic transfer [3, 4]. During analysis with using code FRESKO were obtained optimal parameters of potentials and extracted spectroscopic factor which is 1 for  $^{20}\text{Ne}$  as  $\alpha+^{16}\text{O}$ .



### Reference:

1. R. Stock, U. Jahnke, D.L. Hendrie, J. Mahoney, C.F. Maguire, W.F.W. Schneider, D.K. Scott, and G. Wolschin, Phys. Rev. C 14 (1976) 1824.
2. N. Burtebayev, M. Nassurlla, D. Alimov, I. Boztosun, J. Burtebayeva, A.K. Morzabayev, S.K. Sakhiev, S.V. Artemov, J.M. Mussaev // Optical and Coupled-Channels Description of  $^{20}\text{Ne}+^{16}\text{O}$  Elastic Scattering // Journal of Physics: Conference Series. Vol. 590(2015) 012056.
3. N. Burtebayev, Sh. Hamada, K.A. Gridnev, N.Amangeldi Analysis of alpha-cluster transfer in  $^{16}\text{O}+^{12}\text{C}$  and  $^{12}\text{C}+^{16}\text{O}$  at energies near Coulomb barrier. // Nucl. Phys. A. – 2011. – Vol.859. – P. 29-38; (P. 29-34; 37-38).
4. N. Burtebayev, M.K. Baktybayev, M. Nassurlla, A.K. Morzabayev, S.K. Sakhiev, K. Rusek, E. Piasecki, S. Kliczewski, S.B. Sakuta, Sh. Hamada, S. Torilor // Alpha Cluster Transfer in  $^{16}\text{O}+^{12}\text{C}$  at Energy 41.3 MeV // Abstracts of The VII European Summer School on Experimental Nuclear Astrophysics, September 2013, Santa Tecla, Italy.