

# Report of the 5th International Conference on Contemporary Physics (ICCP-V)

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## Abstract

The 5th International Conference on Contemporary Physics was take place in Ulaanbaatar, Mongolia, 3-6 June 2013. This conference is being organized with the support of the International and Mongolian organizations involved in research and education: Joint Institute of Nuclear Research, Dubna, Russia, Nuclear Energy Agency of Government of Mongolia, National University of Mongolia and Mongolian Academy of Sciences.

## 1 Introduction

The 5th International Conference on Contemporary Physics (ICCP-V) was held in National University of Mongolia (NUM), 3-6 June 2013. The previous conferences in this series were held in 2000, 2002, 2005 and 2007. The ICCP-V aims to provide a good opportunity for expert working in various topics of Contemporary Physics to discuss the latest research activities, to consider the prospects of applications and to simulate interdisciplinary exchanges. This conference also provides the opportunity for round table discussions on special cross-disciplinary issues. There were 26 talks and 23 poster presentations, scheduled at 8 sessions during 4 days of the conference. The conference covers wide range of topics which can be found following topics:

Nuclear Physics and Technology

- nuclear structure
- nuclear reactions
- nuclear analytical methods and technology
- nuclear energy technology
- radiation biology and radiation protection

High Energy and Particle Physics

- experimental study of the high energy physics
- theoretical models of elementary particles

Condensed Matter Physics

- nano-structures
- crystal structure and dynamics

## 2 Objectives

The conference was included four sessions. After opening speech of Prof. S. Davaa (Nuclear Research Center, NUM), the first session “Hight energy Physics” was started by Nikolai Russakovich (Joint Institute of Nuclear Research, Russia). He talked about the Higgs boson discovery is the most important result obtained at the Large Hadron Collider. History of this achievement was briefly overviewed and the recent results on Higgs boson properties were reported.

In the session II, “Condensed Matter Physics” was included five speakers. Here, Prof. O. Lkhagva (National University of Mongolia) presented about the Monte Carlo methods built in Geant4 toolkit were used for the track structure simulation, induced by radionuclide emission in small biological objects at nanometer scale.

The third session of the conference was named “Nuclear Physics”. Session III consisted three presentation from Nuclear Reaction Data Center (JCPRG), Hokkaido University.

Prof. K. Katō presented two topics which they have studied recently. The first topic is the scattering phase shifts in the complex scaling method (CSM). The scattering phase shifts have been studied as important scattering quantities, and here shown to be calculated from the continuum level density (CLD). They develop the CLD method to investigate the resonant states separating resonance and background terms of the calculated phase shifts. This new method is applied to the complex scaled orthogonality condition model of several scattering systems including  $\alpha + \alpha$  and  $\alpha + n$ . The background phase shift is also obtained by using the rotated continuum solutions in the CSM. They discussed several problems of resonances in this framework, and show that this method is very promising to investigate the resonance structure in the observed scattering cross sections.

The second topic is the electro-magnetic dissociation reactions of halo nuclei. Halo nuclei show large breakup cross sections due to their extremely weak binding properties. They have obtained many interesting knowledge on the exotic structure of neutron halo nuclei which suggest a large deviation from the standard understanding of stable nuclear structure.

Dr. D. Ichinkhorloo introduced about compilation and evaluation of nuclear reaction data in JCPRG to the poster section of the conference. This poster presented current status of our activities on compilation and evaluation of nuclear reaction data. For the compilation, since 1974, JCPRG have compiled charged-particle and induced nuclear reaction data obtained in Japan in the original database, Nuclear Reaction Data File (NRDF). Part of the compiled data in NRDF is converted into the EXFOR (EXchange FORmat) format and transmitted to the International Network of Nuclear Reaction Data Centres (NRDC). The NRDC has 14 nuclear data centres around the world, and one of them is the Hokkaido University Nuclear Reaction Data Centre (JCPRG). The contribution of JCPRG is about 10 percent in terms of charged-particle nuclear reaction data. For the evaluation, we presented a study of low-energy nuclear reactions of light nuclei based on cluster structures around the energy region of the threshold of the compound nucleus to separate into an incident particle and a target nucleus which related with nuclear structures and reactions in the frameworks of the coupled discretized continuum channels (CDCC).

D. Ichinkhorloo also presented about microscopic calculations of cross sections for  ${}^7\text{Li}+n$  reactions. In this talk, she introduced calculated results of the total cross sections for the  ${}^7\text{Li}+n$  reactions with the microscopic Jeukenne-Lejeune-Mahaux effective nucleon-nucleon (JLM) interaction for incident energies between from 1 to 150 MeV. The cross section data can be reproduced by the present cluster model with one normalization parameter for the imaginary part of the JLM effective interaction. It is found that the required normalization factor  $\lambda_w$  is larger,  $\lambda_w = 1.0$  from 30 to 150 MeV from the analyses of the total cross section. The calculated total cross sections for  ${}^7\text{Li}+n$  reactions are good agreement with the observed data.

The last session “Nuclear application” was included Dr. H. S. Hwang and Prof. J. Yu. Kim from

Seoul National University, They introduced about challenges and vision in the management of low enriched uranium and spent nuclear fuels, and small modular reactors for Mongolia and nuclear power infrastructure development.

The closing remarks was presented by Ts. Baatar (Mongolian Academy of Science) after conference of the discussion.

### 3 Participants

Participates attending this conference were eight from Russia, two from Korea, two from Japan, fifteen from Mongolia and all other participants are student of the National University of Mongolia. Group photo of all the participants in shown in Fig.1.



Fig. 1: Group photo of the conference

### 4 Summary

The 5th International Conference on Contemporary Physics was held place in Ulaanbaatar, Mongolia, 3-6 June 2013. The workshop was held in the main building of the National University of Mongolia. The previous conferences in this series were held in 2000, 2002, 2005 and 2007, it would be continuously organized in the future and could be good opportunity for expert working in various topics of Contemporary Physics to discuss the latest research activities, to consider the prospects of applications and to simulate interdisciplinary exchanges.

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