DEPARTMENT OF NUCLEAR REACTIONS

Head of Department: *Prof. Andrzej Budzanowski*
Deputy Head of Department: *Prof. Stanisław Drożdż*
Secretary: *Jadwiga Gurbiel*
telephone: (48) (12) 637-02-22 ext.: 210
e-mail: gurbiel@alf.ifj.edu.pl

PERSONNEL:

Laboratory of Nuclear Reaction Mechanism

Head: Professor Andrzej Budzanowski

Research Staff:

Andrzej Adamczak, Ph.D.
Andrzej Budzanowski, Prof.
Jan Balewski, Ph.D.
Bronisław Czech, E.E.
Ludwik Freindl, Ph.D.
Kazimierz Grotowski, Prof.
Elżbieta Guła, Ph.D.
Jacek Jakiel, M.Sc.
Waldemar Karcz, Ph.D.
Małgorzata Kistryn, Ph.D.
Stanisław Kliczewski, Ph.D.
Adam Kozela, Ph.D.
Ewa Kozik, Ph.D.
Jerzy Łukasik, Ph.D.
Michał Palarczyk, Ph.D.
Krzysztof Pysz, Ph.D.
Regina Siudak, Ph.D.
Artur Siwek, Ph.D.
Irena Skwirczyńska, Ph.D.
Paweł Staszel, Ph.D.
Jarosław Szmider, Ph.D.
Henryk Wojciechowski, Ph.D.
Roman Wolski, Ph.D.
Michał Ziółkowski, Ph.D.

Technical Staff:

Edward Białkowski, Ch.E.
Janina Chachura
Marek Gruszecki, Ph.D., E.E.
Wiesław Kantor, M.Sc., E.E.
Kazimiera Pogorzelska

Laboratory of Nonlinear Dynamics

Head: Professor Stanisław Drożdż

Research Staff:

Stanisław Drożdż, Prof.
Andrzej Górski, Ph.D.
Beata Kulessa, Res. Student
Jarosław Kwapień, Res. Student
Jacek Okołowicz, Ph.D.
Tomasz Srokowski, Assoc. Prof.
Antoni Szczurek, Assoc. Prof.
Marek Wójcik, Res. Student

Visiting Scientist:

V. Uleshchenko - Kiev Institute of Nuclear Research, Ukraine

Energy Efficiency Center

Head: Assoc. Professor Edward Obryk

Staff:

Marek Ćwikilewicz, M.Sc. Edward Obryk, Assoc. Prof.

Barbara Obryk, M.Sc.

OVERVIEW:

The year 1998 can be considered as very successful both in harvesting important results from the existing collaborations as well as establishing new ones.

In the frame of the COSY-11 collaboration cross section for η' production in p-p collision close to the threshold has been measured. In the region of excess energy between 1.5 and 4.1 MeV the η' cross sections are much lower than those of the π^0 and η production. There seems to be no indication that N* resonance doorway-like state governs the reaction mechanisms. The determined coupling constant $g_{\eta' pp}$ appears to be consistent with the prediction of the simple quark model. Results were published in Phys. Rev. Letters.

Using the GEM detector, investigations of the isospin symmetry breaking were performed. Two reactions channels $^3He\pi^0$ and $^3H\pi^+$ from the reaction at proton momenta 700, 767, and 825 MeV/c were measured. Data analysis is in progress.

The model of the meson cloud in the nucleon which is a speciality of our department has been successfuly applied to explain the leading proton and neutron cross sections from the e^+ or e^- - proton collisions at the HERA ring.

General formulas to calculate polarization of the particles with spin transmitted through the barrier in the presence of strong magnetic fields were obtained. New collaboration between our laboratory and the Institute for Nuclear Research in Kiev has been established. One PhD thesis was completed in the frame of this collaboration.

We joined the new collaboration with Lund University concerning studies of hot nuclear matter properties using heavy ions from CELSIUS ring. First test of the phoswich detector for the forward wall was performed in Uppsala.

Isoscalar giant dipole resonance strength distribution 3 $\hbar\omega$ has been evaluated in ^{208}Pb in the space of 1p1h and 2p2h excitation. The centroid energy of this state can directly be related to the nuclear incompressibility module. Our result indicates rather large values of this module.

New method of determination the values of the optical model potential parameters for the ^{9}Be - ^{12}C interaction has been proposed. Due to several constraints, ambiguities in the parameter determination are removed.

A quantitative mathematical analysis of the ECG data aimed to predict phenomenon of the sudden cardiac death was performed. Properties of the Lévy distribution in studying the dynamics of heartbeat were tested.

Resonant ddμ molecule formation in 3K solid deuterium was studied.

We also entered the Saphir collaboration at the ELSA synchrotron in Bonn. Further progress in studying the transverse polarization of positrons from the decay of polarized muons at PSI cyclotron was achieved.

Theoretical studies of nonlinear dynamical systems with algebraically correlated noise and shell model embedded in the continuum were performed.

We started construction of the light heavy ion detector for low heavy ion energies which are emitted in the spallation reactions induced by cosmic ray protons.

Altogether 26 papers in respectable Journals from the Philadelphia List were published. Two PhD Thesis on the subjects of barier penetration time and multifragmentation phenomena were completed.

Professor A. Budzanowski