II. REPORTS ON RESEARCH

1 DEPARTMENT OF NUCLEAR REACTIONS

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Overview

During last year the physicists of the Department of Nuclear Reactions were involved in many experiments and projects:

- Low energy nuclear reactions

For the first time a heavy ion beam from the Warsaw Cyclotron C-200 was used to investigate elastic and inelastic scattering of ^{12}C ions from ^{12}C target. The experiment is a part of a long range programme devoted to study the energy dependence of the nucleus - nucleus interactions.

- Multifragmentation of relativistic heavy ions

Multifragmentation reactions induced by ^{12}C on different heavy targets and at different energies were studied in experiments performed at Gesellschaft für Schwerionenforschung by the ALADIN Collaboration. These asymmetric systems were investigated in order to study the interplay between preequilibrium and equilibrium phenomena in the nuclear liquid – gas phase transition.

- The structure of nucleons

A novel, two - structure description of the Roper resonance was proposed on the basis of the α – p scattering data reanalysed by means of a T – matrix formalism.

- Atomic physics

Emission of the X-rays by fast heavy ions (S, Ti, Fe) as they traverse the matter (thin carbon or other light element foil) was investigated in a series of experiments performed at University of Erlangen. It was demonstrated, that the characteristic K_α X-rays emitted by a heavy ion can serve as a tool for Z-value control of the ion.

- Material research

Semiconductor heterostructures were investigated by means of Rutheford Back Scattering and Channeling methods using the 2 MeV α particles from the Van de Graaff accelerator "Lech" at the Department.

The following reports present the results and major successes which were achieved in 1999.