



## 2 DEPARTMENT OF NUCLEAR SPECTROSCOPY AND TECHNIQUE

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### Overview

During the last year, the activity of our department was spread over basic research in nuclear physics (standard spectroscopy, more exotic regions close to the elementary particle physics, theoretical studies of heavy ion interactions), high energy atomic physics, applications of and nuclear physics (environmental studies, effects of irradiation, ion production). Some effort was focused on teaching – actually, four Ph. D. students are working for their degrees. Some of us were involved in organisation and further activity of the “Radioactive Waste” exhibition in Swierk.

Our research is performed on our facilities (C30 cyclotron, low background detection facility), and in close co-operation with the Heavy Ion Laboratory of the Warsaw University, Jagellonian University in Cracow, Military Technical Academy in Warsaw, Institute of Electronic Technology and Materials in Warsaw and some foreign centers like GSI in Darmstadt, MPI in Heidelberg and KFA in Julich (Germany), PSI in Villigen (Switzerland), University of Notre Dame, Argonne National Lab., Lawrence Berkeley Lab. and Los Alamos National Lab. (USA).

The reader is invited to find some of our recent results on the next pages, together with a list of publications. Nevertheless some activities are worth mentioning:

Nuclear spectroscopic studies were concentrated on  $Z$  or  $N = 50$  nuclei – determination of excited level schemes of  $^{182,183}\text{Ir}$ ,  $^{180,181,182}\text{Os}$  and  $^{110}\text{Sn}$  and  $^{132}\text{Ce}$  was continued and some new effects found.

The most precise lifetime of the  $\Lambda$  hyperon in very heavy hypernuclei was measured (COSY#13 project). The search of muon number forbidden nuclear  $\mu - e$  nuclear conversion was continued (SINDRUM II coll.).

Heavy ion interactions leading to fusion or fission processes were studied theoretically, and the experiments are in preparation.

The experimental studies of atomic effects in bare, H- and He- like very heavy atoms and X ray spectroscopy of heavy ion atomic collisions were continued at GSI and PSI.

The study of radiation-induced modification of optical properties using the C30 proton beam was found to be a very interesting subject and resulted in many publications.

A new idea of application of the artificial neural nets technique into calculations and control of the industrial exhaust gas purification systems employing electron beam irradiation has been invented and the results seem to be encouraging.

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