2. DEPARTMENT OF NUCLEAR SPECTROSCOPY AND TECHNIQUE

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Overview

Departamental at activity was concentrated on two different regions according to the Department's name: "spectroscopy" (basic research) and "technology" (applications). Simultaneously, some effort was focused on teaching. At present, three Ph.D and two M.Sc. students are working for their degrees under supervision of members of the Department. In 1996 one Ph.D was obtained and one M.Sc. student was graduated.

Our research was activated by cooperation with several Polish, European and USA centres and by access to their experimental facilities like the C200 heavy ion cyclotron of the Warsaw University, the heavy ion accelerator complex at GSI in Darmstadt (Germany), PSI cyclotrons in Villigen (Switzerland), NORDBALL, ANL-UND BALL and GAMMASPHERE detectors. However, some results were also obtained using our C30 proton cyclotron, the crystal X-ray spectrometer installed on the SINS EAK electron accelerator and our low background gamma detection facility.

Our mass separator has finally been moved to the C200 cyclotron area after more than twenty years of work on a new start on heavy ion beams. On-line radioactive ion sources are under preparation in cooperation with our Department.

The reader can find short abstracts of our activity and a list of publications in this Annual Report. Nevertheless, it is worthwhile to stress some highlights of 1996.

i) Calculations of heavy ion collision dynamics were performed in cooperation with the SINS Theory Department and LBL at Berkeley (USA). It has been shown that the experimental data on the mean kinetic energies of fission fragments are not sufficient to distinguish between one- and two-body dissipation. The mass flow seems to be more sensitive to the dissipation mechanism.

ii) A final analysis of the NORDBALL experiments on the excited states of nuclei in the vicinity of ^{100}Sn. The level structures of ^{99,101,102,103}Cd, ^{101,103,105}In and ^{105}Sn are reasonably well described by the shell model. This gives predictions for the structures of other nuclei in this exotic region.

iii) The discovery of two high spin isomers in ^{183}Ir and two superdeformed bands in ^{149}Tb in experiments at LBL on ANL-UND BALL and GAMMASPHERE detectors.

iv) Determination of radionuclide concentration in the air, some plants and soil. In particular, the map of concentration of ^{210}Pb in our soil is an unique achievement.

v) Participation in the project of the flue gas treatment plant using the electron beam method for the "Pomorzany" coal power plant coordinated by the Institute of Nuclear Chemistry and Technology under the supervision of the IAEA in Vienna.

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