GRANTS:

1. *M. Waligórski*
   grant No 607359101 (The State Committee for Scientific Research),
   Analysis of microdeposition of energy for determination of radiation hazard, including that from radon (completed 31 March 1994);
2. *M. Waligórski*
   grant No 224309203 (The State Committee for Scientific Research),
   Modelling of interaction of nuclear radiation in nanometre volumes;
3. *T. Niewiadomski*
   grant No 607379101 (The State Committee for Scientific Research),
   Investigation of the concentration of radon in dwellings over southern Poland (completed 31 December 1994);
4. *M. Waligórski*
   EEC grant No FI3P-CT92-0018 (European Union),
   The measurement of environmental radiaton doses and dose rates;
5. *P. Olko*
   EEC grant No FI3P-CT920032 (European Union),
   Dosimetry of beta and low-energy photon radiations.

INTERNATIONAL COLLABORATION PROGRAMMES:

1. Polish-German Collaboration: Quantitative Assessment of Radiation Hazard, with Prof. Müller-Gärtner/Dr Th. Schmitz, Institute of Medicine, KFA Jülich;
2. Polish-German Collaboration: Neutron Dosimetry with TL Detectors, with Dr Piesch, HSD, KfK Karlsruhe.

OVERVIEW:

The activities of the Health Physics Laboratory at the Institute of Nuclear Physics in Cracow are principally research in the general area of radiation physics, and radiation protection of the employees of the Institute of Nuclear Physics. Theoretical research concerns radiation detectors, radiation protection (modelling of radiation effects in biological and physical systems) and studies of concepts in radiation protection. Experimental research concerns solid state dosimetry, mainly thermoluminescence (TL) dosimetry (present thrust: development of thin TL detectors for beta-ray and mixed neutron field dosimetry, development of ultra-sensitive LiF: Mg, Cu, P phosphors) and environmental radiation measurements (radon in dwellings, low-level natural radiation). The Laboratory provides expert advice on radiation protection regulations at national and international levels. Routine work of the Health Physics Laboratory involves design and maintenance of an in-house developed TL-based personnel dosimetry system for over 200 radiation workers at the INP, monitoring and supervision of radiation safety on INP premises, and advising other INP laboratories on all matters pertaining to radiation safety. Over the years, under the earlier leadership of Prof. Tadeusz Niewiadomski (now retired, Consultant to the Laboratory), considerable expertise in TL dosimetry has been gained at

the Laboratory: sintered TL detectors, based on LiF (Mg, Ti-doped, equivalent to HARSHAW TLD-100, TLD-600 and TLD-700, and Mg, Cu, P-doped, of properties similar to those of ultra-sensitive "Chinese" GR-200 phosphors) are produced, as well as gamma-irradiators and annealing ovens. A new micro-processor controlled laboratory TL reader, model RA94, is produced by the MICROLAB company in close collaboration with our Laboratory. The Health Physics Laboratory is able to accept not only commercial orders for production of large quantities of TL detectors and of TL laboratory equipment, but also to produce on request non-standard TL detectors according to specification, and to train and advise in the applications of TL dosimetry.

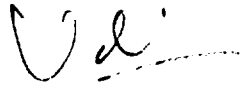
1994 was another year of intense activity in our Laboratory. We were especially pleased to be offered collaboration within two European Community grants: The measurement of environmental radiation doses and dose rates and Dosimetry of beta and low-energy photon radiations, coordinated by Dr Botter-Jensen and Dr Christensen, both from the Risoe National Laboratory, Denmark. Together with three other research grants from the Polish State Committee for Scientific Research, our finances were considerably easier than those of our colleagues in other research groups who suffer to a far greater extent from our Government's policy towards science and education. We are investing a large proportion of this external support into research equipment, especially into TLD hardware, such as annealing ovens and TL readers, and computer software and hardware (including a small laboratory computer network interfaced to the main network of the Institute). A major publication on the TL efficiency of our MCP-N (LiF: Mg, Cu, P) phosphors to photons, beta-electrons, alpha particles and thermal neutrons, summarizing our work on this subject, has been published in Radiation Protection Dosimetry. We have prepared and submitted abstracts of about ten papers to the 11th International Conference on Solid State Dosimetry (Budapest, 1995). Mr Budzanowski and Mr Bilski took part in an environmental dosimetry intercomparison organized at Risoe National Laboratory in June 1994 and presented two papers at the LUMDETR'94 International Conference in Tallin (Estonia). We continued our long collaboration with the Institute of Medicine of the KFA Juelich and the Radiation Protection Laboratory of the KfK Karlsruhe (both in Germany). Dr Olko and I travelled to China (Beijing and Guangzhou) and to Kharkov (Ukraine) to establish new collaborations in the areas of application of TL dosimetry, radiobiological modelling and radiation protection. Dr Olko was heavily engaged in the activities of the European Dosimetry Group EURADOS, as participant of the EURADOS meeting in Strasbourg, as contributor to the Workshop: Advances in Radiation Measurements at Chalk River (Canada) and as author of a chapter on Tissue-Equivalent Proportional Chambers in a major Working Group 10 EURADOS publication. I was honoured to be invited by Prof. Jaworowski, Delegate of Poland, to act as his Consultant at the 43rd Session of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) in Vienna. I also took part in the work of the Standing Committee of the International Conferences on Solid State Dosimetry, preparing the 11th SSDC to be held in Budapest in 1995, and regularly attended the meetings of the Scientific Council of our Institute and of two Sub-Committes of the National Board for Atomic Energy. Prof. Niewiadomski was actively pursuing research in the area of radon measurements: apart from completing the second part of the survey of radon concentration in houses in the Southern region of Poland and submitting a publication on this subject to NUKLEONIKA, he edited a brochure Radon - Properties, Hazard and Prevention (in Polish) intended for lay readers and state administration. Together with Ms. Ryba, the Chief Radiation Protection Officer for the INP, Prof. Niewiadomski also prepared a new edition of Ionizing Radiation, its Sources and Effects (also in Polish), a compendium

of information on radiation protection used to train the personnel of the INP. I gave a regular undergraduate course on Radiation Dosimetry in Oncology to the students of the Academy of Mining and Metallurgy and Prof. Niewiadomski and Dr Olko gave a number of lectures on the general topics of radiation protection, environmental dosimetry and radiobiological medelling. Two students are preparing their M.Sc. projects in our Laboratory. Dr Pawel Olko is working on his habilitation thesis, and Mr Pawel Bilski, together with Mr Krzysztof Kozak (Environmental Radioactivity Laboratory, Department of Nuclear Physical Chemistry) and Mr Janusz Gajewski (Department of Radiation and Environmental Biology) are working on their Ph.D. projects under my supervision.

Two members of our research staff, Dr Olszewska-Wąsiołek and Dr Wąsiołek, are continuing their leave of absence from the INP for the third consecutive year and are now at the New Mexico Institute of Mining and Technology, Socorro, NM, USA.

We have began to be actively involved in developing medical applications for the new AIC-144 cyclotron presently being tested at the INP. Inspired by Prof. Budzanowski, Director of our Institute, over the second half of 1994, Dr Olko, Dr Taraszkiewicz (Cyclotron Division) and I became heavily engaged in preparing a Hadron Radiotherapy Centre Proposal for the Polish-German Cooperation Foundation and the State Committee for Scientific Research. Work on this project involved collaboration with the Centre of Oncology in Cracow, the Clinic of Ophtalmology, the Institute of Molecular Biology (both Jagellonian University) and the Department of Physics and Nuclear Techniques of the Academy of Mining and Metallurgy, and with several Divisions and Departments of our Institute, to design a facility for proton therapy of eye melanomas and fast neutron radiotherapy facilities and the supporting pre-clinical, clinical and research programs which could utilize the 60 MeV proton and neutron beams to be produced by the AIC-144 cyclotron. This 6 million DM project was submitted to the Polish-German Cooperation Foundation and the Polish State Committee for Scientific Research at the end of 1994, after its positive evaluation by several foreign experts during a short International Workshop on Hadron Radiotherapy which we organized at the INP on 30 November 1994. We keep our fingers crossed, hoping now for a positive reaction from our sponsors. With our colleagues at KFA Jülich we co-authored a paper on modelling the radiobiological properties of therapeutical proton beams, which was presented at the meeting of the Proton Therapy Co-Operative Group (PTCOG) at Chiba, Japan in November 1994.

Since the beginning of 1993, apart from leading the Health Physics Laboratory, I also head the Medical Physics Department of the Cracow Division of the Maria Skłodowska-Curie Centre of Oncology. Managing two excellent and hard-working teams is no easy task. I hope to move some of the research activities of the Health Physics Laboratory closer to physics in radiotherapy and, in particular, to applications of TL and alanine dosimetry in clinical measurements and in Quality Assurance procedures for radiotherapy.



Assoc. Prof. Michael P.R. Waligórski