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Foreword

This volume contains the proceedings of the Symposium on Twenty Years of Physics at the Mainz Microtron (MAMI), which was held at the Johannes Gutenberg-Universität Mainz, October 19-22, 2005. The Symposium marks the retirement of several members of the Institut für Kernphysik whose work has been devoted primaryly too scientific research at MAMI over many years. It was the primary aim of the Symposium to review past and current activities in the field of hadronic structure investigations with the electroweak interaction. However, the Symposium also gave an outlook on the physics with the MAMI upgrade, a double-sided mictrotron that is expected to provide a high-quality beam of up to 1.5 GeV later this year.

The Institut für Kernphysik was founded in the early 1960s by the late Hans Ehrenberg who served as its director for more than two decades. He provided the Institute with a 350 MeV pulsed linear electron accelerator, which became available in 1966 for studies of charge and magnetization distributions in nuclei and nucleons as well as photonuclear investigations in collaboration with the Max-Planck-Institut für Chemie.

Hans Ehrenberg knew about the importance of having excellent facilities for performing outstanding physics from his earlier studies at Bonn and Stanford, with the later Noble Prize winners Paul and Hofstadter, respectively. Therefore, he dedicated great effort in I) building up a perfect infrastructure of mechanics, electronics, vacuum and computer workshops, and II) attracting a young accelerator physicist, Helmut Herminghaus, to the Institute.

In the late 1960s it became common wisdom that the next accelerator generation had to provide a high duty-factor in order to perform coincidence experiments for detailed studies of hadronic physics. Helmut Herminghaus had conceived a blueprint for such a device in 1975, a three-stage racetrack microtron (RTM). Shortly after a physics program around this RTM was worked out and the proposal was sent to the sponsoring agencies. The project received the support of the University and the State of Rheinland-Pfalz and sometime later also of the federal agencies. In the fall of 1978, the state minister was informed by the federal minister of research and technology (BMFT) that the project had been discussed with the German Science Council, the Deutsche Forschungsgemeinschaft (DFG), the Max-Planck-Gesellschaft, and members of the scientific community. As a result these representatives agreed to support the proposal in order to I) demonstrate that also a large-scale research facility can be realized at a university, II) withstand a further "emigration" of such research from the universities, and III) find a constructive solution that could serve as a model for university research. As a matter of fact such a solution was found in the following years. However, it has to be said that the full financial support would never have arrived if the RTM had not been designed stage by stage, and each time delivered in perfect shape (often to the surprise of outside experts) by Helmut Herminghaus and his crew of physicists and technicians. The first stage of the RTM (14 MeV) went into operation already in May 1979, the second stage (183 MeV) followed in 1983, and the last stage was ready for the experiments in the fall of 1990.

At present the microtron delivers a continuous beam of an intensity of about 100 μA for unpolarized and 40 μA for polarized electrons with a polarization degree of about 80 %. Its energy close to 1 GeV provides the perfect resolution to study the distributions of charge, magnetization, and strangeness inside the nucleon and light nuclei, the threshold production of the Goldstone bosons pion and eta, the polarizabilities of nucleons and pions, and the excitation of the most prominent nucleon resonance, the $\Delta(1232)$. Since the physics with the first two stages of the RTM was summarized already at an earlier workshop ("Physics with MAMI A"), the present Symposium concentrates on the achievements of the years with the 855 MeV stage (MAMI B). The organizers also decided to invite as speakers, with a few exceptions, young colleagues who have made a career with their work at MAMI.

It remains to say thank you to many people and institutions for continuing support. We are grateful to all the colleagues from the Institute, the postdocs, Ph.D. and younger students who contributed to the MAMI project.

Special thanks go to the people in the workshops and in the administration without whose efforts the project could never have succeeded. We are grateful to the colleagues from the neighbouring Institut für Physik for their work on polarized beams and targets, for the TAPS detector brought to Mainz by the Gießen group, to the Bonn/Bochum group for the polarized H_2-target, and to many other German institutions for active engagement and various detection devices, notably Darmstadt, Erlangen, Göttingen, and Tübingen. Our thanks go to the foreign colleagues who have participated in the project from the very beginning, notably to our Scottish colleagues who built the photon tagger with the support of their SERC, the groups from Pavia sponsored by the INFN, from Saclay supported by the CEA/DAPNIA and from Orsay supported by the CNRS. We appreciate common experimental and theoretical work with physicists from various other places in Europe, *e.g.* Amsterdam (NIKHEF), Basel, Genova, Gent, Lljubljana, Trento and several Russian universities and institutions, and from overseas, *e.g.*, Jefferson Lab, MIT, Florida State University, University of Nagoya, George Washington University, and TRIUMF. Finally, in view of the upgrade two more collaborations have developed in recent years. The Crystal Ball Collaboration has shipped its detector from the Brookhaven National Lab to Mainz, and the KAOS detector is being installed in Mainz with the help of the GSI Darmstadt. Last but not least we are grateful to the members of the international Program Advisory Committee and of numerous evaluation and expert committees for their invaluable scientific advice and moral uphold.

Concerning the institutions we first and foremost thank our Physics Faculty, the Johannes Gutenberg-Universität and the State of Rhineland-Palatinate for continued and coherent support. We are extremely grateful to the state and to the federal ministries (BMFT, BMBW, BMBF) who financed the construction of the new accelerator and experimental halls as well as the large spectrometers via the university construction program (HBFG). Our special thanks go to the Deutsche Forschungsgemeinschaft that backed up the project by means of Collaborative Research Centers (SFB 201, CRC 443) whose resources were of the utmost importance to sustain our postdoc and PhD program. Finally, we received recent support by the European networking activities via the I3HP/Transnational Access program.

Last but not least the organizers are grateful to the speakers of this Symposium for summarizing the various achievements with MAMI and related research, and for bringing back memories of the past. Though retirees enjoy the latter aspects very much, there is no reason to engage in retrospection: The double-sided microtron is expected to yield its 1.5 GeV electron beam later this year, and we wish our colleagues and their students all the success in the years to come!

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