PREFACE

The annual report of the *Beschleunigerlaboratorium der Ludwig-Maximilians-Universität München und der Technischen Universität München* for the year 2000 provides information on experimental and theoretical studies performed by physicists from both universities in the field of *Nuclear Physics and Particle Physics.* The contributions describe experiments performed at the *Tandem accelerator in München* and investigations pursued at external research centers in which physicists from Munich have played a major role, as well as theoretical work related to these activities. Highlights of these activities are listed below:

- Using the Accelerator Mass Spectrometer *AMS* with the gas-filled magnet the search for radioactivity from a nearby supernova was continued with a fine time resolution. An enhanced ^{60}Fe input on earth is clearly observed approximately 3 Myr ago, lasting less than 1.5 Myr.
- The new scanning ion microscope *SNAKE* has been improved in its stability and performance. First experiments show the improvement in the analysis of heavy elements by particle induced X-ray emission using 20 MeV protons.
- High resolution elastic recoil detection has been advanced with respect to depth resolution and reliability. It was extensively used to investigate commercial ultra thin gate oxides for future microelectronics as well as hydrogen management in platinum films on GaN Schottky diodes.
- The new ion source for negative beams of polarized hydrogen and deuterium ions started operation. The ten times higher ion beam intensity enables together with a new radiation-resistant focal plane detector for the Q3D magnetic spectrograph the study of supersymmetric heavy odd-odd nuclei in multi-particle transferreactions.
- A cosmic ray telescope for commissioning and calibration of the large area muon chambers for the *ATLAS* experiment at the pp-collider *LHC* at *CERN* has been developed and the concept has been studied with a first chamber.
- The *OPAL* experiment at the electron-positron collider *LEP* at *CERN* has completed data taking at energies energies up to 209 GeV. The analysis of the rich harvest of data is providing an unprecedented predictive power to the Standard Model and a new level of sensitivity for the search for signals of new physics.
- The *DØ* experiment at the $p\bar{p}$-collider *TeVatron* will extend the programme of LEP to very high energies. After a major upgrade of the machine and the experiment the DØ detector has been successfully commissioned for the new running period in spring 2001.
- GEM, silicon microstrip and straw tube detectors were developed for the COMPASS experiment at *CERN*.
- R & D for new types of experiments searching for solar neutrinos and dark matter at the *Gran Sasso Laboratory* in Italy is ongoing.
- The *HADES* experiment at *GSI* has been successfully tested in a number of beamtimes and its RICH detector, built in Munich, has observed and identified the first rings from leptons in heavy ion collisions.
- The β-decay half-lives of the heaviest N=Z nuclei have been measured at the fragment separator of GSI. The results are important for nuclear structure physics, for astrophysics and for questions of the weak interaction.
- Several components of a new accelerator for radioactive ion beams at *CERN (REX-ISOLDE)* were taken into operation in parallel to the construction of a fission fragment accelerator at the new high-flux reactor *FRM-II* in Garching.
- Crystalline ion beams could be produced and identified for the first time in the laser cooled rf-storage ring PALLAS.
- New methods were developed for the production of ultracold neutrons for the *FRM-II* and a new source for future experiments was set up.

Several activities are linked to a restructuring of this laboratory focussing on the development of powerful local research facilities at the new FRM-II and the participation in key experiments at the forefront of basic research at large scale international facilities. In addition, the link with theoretical physicists from both universities has been strengthed with a very fruitful mutual inspiration concerning present and future experiments. In particular, collaborations have been formed in the field exotic nuclei, the properties of hadrons in nuclear matter, relativistic heavy ion collisions, the study of hadron structure using high energy lepton beams at *DESY* and *CERN*, the search for new types of interactions at *CERN*, *DESY* and *Fermilab* and the study of massive neutrinos and dark matter.

The *Tandem accelerator* has performed very well during approximatley 280 days of operation supporting a substantial amount of results on nuclear and applied physics as well as test beam studies for detector development and the new facilities at the FRM-II.

The Beschleunigerlaboratorium offers a high quality education in modern research which is reflected in the diploma and PhD theses listed at the end of this report and also by external funds acquired specifically for the training of young physicists.

As in all the previous years the budget to run the experiments and the laboratory was provided by the state of Bavaria. Individual projects were supported by grants provided by the DFG, the BMBF, the DAAD, the Alexander-Humboldt-Stiftung and the European Union. With this annual report we want to inform all our sponsors and our friends and colleagues about our work, and we want to thank them.

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