Preface

This report summarizes past year's achievements of the Physik-Institut's sixteen research groups, covering both experimental and theoretical physics. Experimental activities include the physics of biological systems, nanometer structures and surface physics, fundamental properties of materials and high-temperature superconductivity as well as accelerator and non-accelerator based elementary- and astro-particle physics, while theoretical research concentrates on precision calculations of QCD processes and on fundamental aspects of elementary particle physics.

End of July 2014 Prof. Hugo Keller, a long-term member of the institute, retired. As an expert on magnetic properties of superconducting materials he used a variety of experimental techniques, such as μSR and torque magnetometry, to improve our understanding of high-T_C superconductivity and other magnetic features in solids. Hugo is a gifted teacher, as for instance his lectures on modern physics are highly appreciated by the students. Hugo served as institute director for eight years and was member of numerous faculty and scientific committees. A detailed presentation of Hugo's scientific career follows further below.

In June 2014 Prof. Gino Isidori joined our department, working in the field of theoretical elementary particle physics. His research activities include dynamical flavor models, the search for physics beyond the standard model and the stability of the standard model Higgs potential and are summarized in Sec. 1.

In January 2015 Prof. Johan Chang joined our department. A new laboratory for research in hard condensed matter is being set-up, where his group will investigate fluctuations of correlated superconductors with thermoelectric experiments. It is planned to construct electronic surface transport instrumentation under ultra-high-vacuum conditions, with the possibility to dope with alkali-molecules. Furthermore, large-scale neutron and synchrotron facilities will be used to explore quantum matter physics. Phenomena such as high-temperature superconductivity and unconventional charge-density-wave ordering will be studied in transition-metal oxides.

We hosted no less than four assistant professors elected and funded by the Swiss National Science Foundation (SNF). Three of them received ERC - Starting or Consolidator Grants as additional support for their research activities.

The institute's 155 employees from 25 countries achieved an impressive number of results, documented in no less than 282 original publications, 216 seminars and presentations on international scientific conferences. Nineteen PhD, seven master, and ten bachelor theses have been completed.

Members of the department participate in many scientific organizations. These include the national research council, research committees of the Paul Scherrer Institut and advisory boards and panels of numerous international research institutions. Our professors also contribute to the academic self administration of the university and take part in many national and international search committees for new professors.

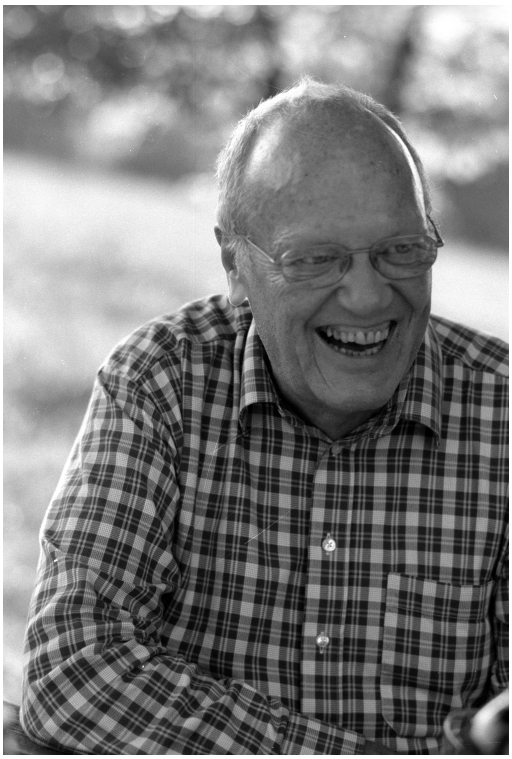
About 900 students have to be taught physics at any point in time. Students of the medical faculty and those of our science faculty in biology, chemistry, geography and mathematics learn about basic physics. We honor the traditional Humboldtian concept of unification of teaching and research, so all our physicists are involved in teaching. They are supported by typically fifteen undergraduate physics students and some senior physicists from other institutions.

Following up on the G-Node summer school held in our institute in September 2013, in January 2015 again a one-week intensive course on advanced scientific programming with Python was given by Nicola Chiapolini, Christian Elsasser and Roman Gredig, attracting 32 participants from 14 institutes, mainly of ETHZ and UZH. Lectures on modern programming techniques were interleaved with practical exercises. The course was a great success and will be repeated in summer 2015.

Members of the institute actively contributed to information events for future students, gave presentations at schools and guided children through our labs. The department participates regularly in the European Masterclass for Particle Physics. There were 25 outreach events organized, corresponding to more than 700 working hours in total.

The success of our research and our international visibility is based to a large extent on the excellent technical infrastructure (mechanical and electronics workshop, information technology) and highly qualified and strongly motivated technical experts. This allows us to construct state-of-the-art laboratory equipment, and develop novel experimental methods further pushing the technical limits. Our success in research and teaching would not be possible without our reliable and efficient administrative staff.

Zürich, June 2015
Prof. Dr. Ueli Straumann



Retirement Prof. Hugo Keller

Hugo Keller was born in 1949 in Aarau. He studied Physics at the ETH Zürich before joining the group of Prof. Kündig at our institute, which was located in the Schönberggasse in those years.

In 1977 Hugo obtained his PhD with a thesis on *Phase transitions in low-dimensional magnetic systems*. In the following Hugo became a research associate in biophysics with Prof. Debrunner and Prof. Frauenfelder at the University of Illinois at Urbana-Champaign, where he studied the dynamics of iron in biomolecules using Mössbauer spectroscopy.

Even when several assistant professorships were offered to him in the US, Hugo was happy to accept the invitation to return to our institute as senior lecturer and research scientist, working on phase transitions with Mössbauer-spectroscopy techniques.

After his habilitation in 1984 Hugo started a very successful μSR (muon spin rotation) research program at SIN (now part of the Paul Scherrer Institute) in Villigen.

In recognition of his forefront research together with Nobel prize winner Karl Alex Müller, his dedication to teaching and his service to the University, he became associate professor in 1995, and full professor in 2001.

Hugo Keller's research in solid-state physics, be it in μSR or in other fields such as torque magnetometry or the study of isotope effects in superconductors, resulted in over 325 published articles which were well-received in the science community as demonstrated by numerous plenary talks at important international conferences.

Hugo contributed a lot to the institute and the faculty life, as the institute's director from 2003 to 2011, in the Fakultätsausschuss, or in his numerous and legendary lectures within the Kinderuniversität and at other instances, such as the *Tag der offenen Tür* in 2004, which he organized together with Paul Ward and John Robinson.

Hugo served on several scientific committees and is still an Associate Editor of the Journal on Superconductivity and Novel Magnetism. He was also very active in the supervision of the physics education at Swiss high schools.

Since August 2014, Hugo Keller is officially retired, but he agreed to teach Introductory Quantum and Atomic Physics for a few more semesters.

We thank Hugo Keller for everything he did for the institute, the students, the faculty and the university, and wish him many carefree and happy years as Professor Emeritus.