Part II
Condensed Matter Physics

There are three solid state physics groups in the department. The main research topics include high-temperature superconductivity, fast ion conductivity, diffusion phenomena and NMR tomography, as well as surface physics and the nanosciences. The research groups profit from a variety of first class equipment for some of the major experimental methods in these fields: nuclear magnetic and quadrupole resonance (NMR/NQR), electron spin resonance (ESR), superconducting quantum interference device (SQUID) and torque magnetometry, angle-resolved X-ray and UV photoelectron spectroscopy (XPS/UPS), laser spectroscopy, scanning tunneling and atomic force microscopy (STM/AFM), as well as muon spin rotation at the Paul Scherrer Institute (PSI) and neuton scattering at the Institute Max von Laue-Paul Langevin in Grenoble (ILL, France). The research activities will also make use of the recently commissioned spallation neutron source (SINQ) at PSI, and of the synchrotron radiation source (SLS, commissioning 2001), where our department is actively involved in the planning of a UV surface science beamline.

A group of theoreticians in computational physics supports the above mentioned experimental groups. The mainly numerical work on high-speed computers comprises investigations such as the microscopic electronic structure of impurities in solids, quantum Monte Carlo simulations and molecular dynamics studies of high-temperature superconductors. In addition the group collaborated with the Institute of Physical Chemistry, the University Hospital and the Department of Neurology.

All research groups enjoy the benefits of national and international collaborations, the most important of which are with ETH Zürich, University of Fribourg, IBM Rüeschlikon, PSI at Villigen and the Synchrotrone Trieste (Italy).

Part II of this Annual Report presents motivations and results on the following projects:

- NMR/NQR Spectroscopy
- Magnetic and Thermal Properties of Superconducting and Related Materials
- Surface Physics
- Laser Dynamics
- Computer Assisted Physics.