

Contents

| | |
|---|-----------|
| Physics of Fundamental Interactions and Particles | 1 |
| 1 Measurement of the Gravitational Constant G | 1 |
| 2 Measurement of the Neutrino Magnetic Moment at the Bugey Nuclear Reactor | 4 |
| 3 Search for μ-e Conversion with SINDRUM II | 8 |
| 4 Rare Kaon Decays | 11 |
| 5 Meson Spectroscopy at LEAR with the Crystal Barrel | 13 |
| 5.1 Annihilation at 900 MeV/c | 13 |
| 5.2 Analysis and results | 14 |
| 6 Production and Spectroscopy of Antihydrogen | 17 |
| 6.1 Introduction | 17 |
| 6.2 Antihydrogen detector | 18 |
| 6.3 Performance of undoped CsI at low temperature | 21 |
| 6.4 First results with antiprotons | 22 |
| 7 Particle Physics at DESY/HERA (H1) | 25 |
| 7.1 Electron proton collisions at 300 to 320 GeV center of mass energy | 25 |
| 7.2 Summary of activities | 27 |
| 7.2.1 Central inner proportional chamber construction | 27 |
| 7.2.2 CIP Electronics | 27 |
| 7.3 A new era of tracking at H1 | 29 |
| 7.4 Results from recent analyses | 31 |
| 7.4.1 Beauty production | 31 |
| 7.4.2 Update on high Q^2 data | 34 |
| 8 Particle Physics at DESY/HERA (HERA-B) | 38 |
| 9 High-precision CP-violation Physics at LHCb | 41 |
| 9.1 Introduction | 41 |
| 9.2 CP – Violation in the B Meson system: recent developments | 41 |
| 9.3 Development of an inner tracking detector for LHCb | 42 |
| 9.3.1 Triple GEM option | 42 |
| 9.3.2 Silicon microstrip option | 44 |
| 9.4 Other collaboration activities | 46 |
| 9.4.1 Hardware developments | 46 |
| 9.4.2 Software | 46 |

| | |
|---|-----------|
| 10 Particle Physics with CMS | 48 |
| 10.1 Introduction | 48 |
| 10.2 Test of irradiated pixel sensors | 49 |
| 10.2.1 Guard ring design | 50 |
| 10.2.2 Pixel design | 50 |
| 10.2.3 Oxygenated silicon pixels | 51 |
| 10.2.4 Beam tests | 51 |
| 10.3 Tracking at CMS: the combinatorial forward Kalman filter | 52 |
| | |
| Condensed Matter Physics | 55 |
| | |
| 11 Superconductivity and Magnetism | 55 |
| 11.1 Introduction | 55 |
| 11.2 Studies of oxygen isotope effects | 55 |
| 11.2.1 Oxygen isotope effects in manganites | 55 |
| 11.2.2 Oxygen isotope effects in cuprates | 56 |
| 11.3 Thermal and transport studies | 61 |
| 11.3.1 New developments in instrumentation | 61 |
| 11.3.2 Electrical transport in doped manganites | 62 |
| 11.3.3 Phase transition of the vortex lattice in cuprates | 63 |
| 11.4 Spectroscopic studies of cuprates (not related to isotope effects) | 64 |
| 11.4.1 NMR and NQR studies | 64 |
| 11.4.2 μ SR studies of ruthenocuprates | 65 |
| 11.4.3 EPR studies of cuprates | 66 |
| 11.5 Experiments with low-energy muons | 67 |
| | |
| 12 Surface Physics | 70 |
| 12.1 Fermi surfaces of the two-dimensional surface states on vicinal Cu(111) | 71 |
| 12.2 Surface states and the stability of adsorbate periodicities: O/Mo(110) | 72 |
| 12.3 Tunneling across hexagonal boron nitride films on Ni(111) | 73 |
| 12.4 Interface states in a metal-insulator heterojunction | 74 |
| 12.5 Co intercalation underneath hexagonal boron nitride films on Ni(111) | 75 |
| 12.6 Status of COPHEE, the COmplete PHotoEmission Experiment | 76 |
| 12.6.1 Electron optics | 77 |
| 12.6.2 Data acquisition hard- and software | 77 |
| 12.7 Near node photo-electron holography | 78 |
| 12.8 Surface Patterson functions from medium-energy electron diffraction | 79 |
| 12.9 Construction of an electron gun for time resolved low-energy electron diffraction | 79 |
| | |
| 13 Physics of Biological Systems | 82 |
| 13.1 Overview | 82 |
| 13.2 Interfacing bio-molecules to silicon structures | 82 |
| 13.3 Mechanical manipulation of DNA molecules in the liquid phase | 83 |
| 13.4 Structural biology of single proteins. | 84 |
| 13.5 Field-ion microscopy and field-emission studies of single C60 clusters in tungsten tips. | 84 |

| | |
|--|-----------|
| 14 Computer Assisted Physics | 85 |
| 14.1 Electronic structure of high- T_c materials | 85 |
| 14.1.1 Transferred hyperfine fields | 85 |
| 14.1.2 Influence of dopants on the electronic structure of high- T_c materials . | 86 |
| 14.1.3 Local distortions in doped La_2CuO_4 | 88 |
| 14.2 Time series analysis of EEG | 89 |
| | |
| Infrastructure and Publications | 91 |
| | |
| 15 Mechanical Workshop | 91 |
| | |
| 16 Publications | 94 |
| 16.1 Research group of Prof. C. Amsler | 94 |
| 16.2 Research group of Prof. R. Engfer | 97 |
| 16.3 Research group of Prof. H.-W. Fink | 97 |
| 16.4 Research group of Prof. H. Keller | 98 |
| 16.5 Research group of Prof. P. F. Meier | 103 |
| 16.6 Research group of Prof. J. Osterwalder | 106 |
| 16.7 Research group of Prof. U. Straumann | 110 |
| 16.8 Research group of Prof. P. Truöl | 112 |