

CONTENTS

I. Experimental Nuclear Physics

1. MEDIUM ENERGY PHYSICS

1.1 Experiments at COSY

Status of the Technical Development of the TOF-Detector.....	5
Associated Strangeness Production at COSY-TOF.....	7
Two step Mechanism for Meson Production.....	8
Improving the cool down time of the liquid H ₂ /D ₂ targets using aluminium in comparison with the copper.....	9
Status of the development of a straw-tracker for the TOF experiment.....	10
First Research with ANKE.....	11
First test of the angular acceptance of the spectrometer dipole D2 at ANKE.....	12
First analysis of the reaction $pp \rightarrow pn\pi^+$ measured at ANKE.....	13
Detection of η^- , η'^- , ω^- and a_0^0 -mesons with ANKE via their decays containing photons in the final state.....	14
η^- and η' -meson production in the reaction $pn \rightarrow dM$ near the threshold.....	15
Possibility to study fast nuclear fragment production at ANKE.....	16
Drift chambers of the ANKE Backward Detector.....	18
Fast Multiwire Proportional Chamber with Dielectric Foil of the ANKE Forward Detector.....	19
ANKE forward Hodoscope first beam measurements.....	20
Optimization of the degrader thickness in the K ⁺ telescopes at ANKE.....	21
Polarized Atomic Beam Source for the ANKE-Spectrometer.....	23
Cluster Targets for COSY.....	25
Study of the reactions $p + d \rightarrow {}^3\text{H} + \pi^+$ and the ${}^3\text{He} + \pi^0$ reactions in the transition region.....	26
Efficiency of Germanium detectors.....	27

Second focal plane of the Big Karl spectrometer.....	28
Investigations of isospin symmetry breaking in the $p+d \rightarrow {}^3\text{H} + \pi^+$ and the ${}^3\text{He} + \pi^0$ reactions at the η production threshold.....	30
Analysis of the $pp \rightarrow pp\eta'$ reaction measured at COSY-11.....	32
Measurement of near Threshold Σ^0 and Λ -Production.....	33
Measurement of the $pp \rightarrow pp\phi$ reaction at COSY-11.....	34
Production amplitude for the $pp \rightarrow pp\eta'$ reaction.....	35
Reactions of the Type $pp \rightarrow ppK^+X$ near the (K^+K^-) -Threshold.....	36
Note on the glue content in the η' meson.....	38
Angular and momentum distribution of the $pp \rightarrow pp\eta$ reaction products.....	39
Development and Test of the Three Threshold Discriminator.....	40
Additional drift chamber for the COSY-11 facility.....	41
The EDDA Experiment: Excitation Functions of Proton-Proton Scattering at Intermediate Energies.....	42
The storage Cell for the EDDA-Experiment at COSY.....	45
Determination of the Λ lifetime in hypernuclei produced in the 1.9 GeV $p+\text{Bi}$ reaction.....	46
Influence of the background shape on hypernucleus lifetime measured in the 1.9 GeV $p+\text{Bi}$ reaction.....	47
First Results on Two – Kaon Production at MOMO.....	48

1.2 Experiments at External Facilities

Strong-interaction effects in the 2p states of antiprotonic hydrogen and deuterium.....	53
Preparations for the ATRAP Experiment: Production and Spectroscopy of trapped Anti-Hydrogen.....	54
The possibility of detecting Anti-Hydrogen in the Phase-One Apparatus of ATRAP.....	55

Light losses and performance of scintillating fibers by interrupted light guides.....	56
The structure of the Roper Resonance.....	57

2. Nuclear Spectroscopy

Study of shape coexistence in nuclei around ^{142}Gd with Euroball.....	61
Experimental Study of the Influence of Crystal Orientation on Ge Detector Pulse Shapes.....	63
Estimation of the Anisotropy of the Drift Velocity for the Development of Ge γ -Ray Tracking Detectors.....	64

II. Theoretical Nuclear Physics

3. MEDIUM AND HIGH ENERGY PHYSICS

Semi-inclusive Pion Production and the d/u Ratio.....	69
Dynamics of Light Antiquarks in the Proton.....	70
Strange Asymmetries in the Nucleon.....	71
Renormalization of the effective chiral pion-nucleon Lagrangian to fourth order.....	72
Pion-nucleon scattering in chiral perturbation theory to one loop.....	73
Wave function renormalized in heavy fermion effective field theories.....	74
Isospin violation in the pion-nucleon scattering lengths.....	75
Effective theory for two-nucleon system.....	76
The nucleons electroweak form factors at low energies.....	78
Strange magnetism in the nucleon.....	79
Muon capture on the proton.....	80
The parity-violating pion-nucleon coupling.....	81
Effective field theory approach to meson production in proton-proton collisions.....	82

Chiral and dispersive description of π N scattering.....	84
Low Energy Hadron Dynamics and Virtual Compton Scattering.....	85
Chiral symmetry and the $N\Delta$ -transition form factors.....	87
The reaction $pp \rightarrow pp\phi$ and the validity of the OZI rule.....	88
Polarization in the reaction $NN \rightarrow NN \pi$	90
On the treatment of NN interaction effects in meson production in NN collisions.....	91
On the momentum dependence of the reaction $\pi^- p \rightarrow \omega n$ near threshold.....	92
The role of the rho-meson nucleon channel in pion photo-production.....	93
The $\pi^- p \rightarrow \pi^0 \pi^0 n$ reaction in the vicinity of the $f_0(980)$ resonance.....	94
On production of the η' -meson in pp-collisions close to threshold.....	95
How important is the pN channel in π N scattering.....	97
A Microscopic Model for the π NN Formfactor in Time Ordered Perturbation Theory.....	98
Off-shell behaviour of correlated $\pi\pi$ exchange in π N scattering.....	99
Comments on the reactions $pp \rightarrow pK^+\Lambda$ and $pp \rightarrow pK^+\Sigma^0$	101
2π production close to threshold: via an intermediate p meson?.....	102
Study of $\Delta\Delta$ excitations in the reaction $n+p \rightarrow d+\pi\pi$	103
The $d(^3\text{He},t)$ charge exchange reaction in the Δ resonance region.....	105
Diffraction production of S and D-wave vector mesons.....	106
Secondary reggeons in diffractive deep inelastic scattering – The microscopic QCD evaluation.....	107
Do the E866 Drell Yan data change our picture of the chiral structure of the nucleon?.....	108
Diffractive vector mesons beyond the s-channel helicity conservation.....	110
Azimuthal asymmetry as a new handle on σ_L/σ_T in diffractive DIS.....	112

Precocious asymptopia for charm from the running BFKL.....	114
The running BFKL: resolution of Caldwell's puzzle.....	115
Neutrino optics of crystals.....	116
Scaling transverse flow in Bjorken's scenario for heavy ion collisions.....	117
Quark energy loss in an expanding quark-gluon plasma.....	119
Enhancement of $\pi A \rightarrow \pi \pi A$ Threshold Cross Sections by $\pi\pi$ Final State Interactions.....	121
Photon-Photon and Photon-Hadron Interactions in pp and AA Collisions.....	123
Bethe-Heitler cross section for very high photon energies and large muon scattering angles.....	124
Bound-Free Production in Relativistic Heavy Ion Collisions and Relativistic Antihydrogen Production.....	125
Bremsstrahlung from Electrons and Positrons in Relativistic Heavy Ion Collisions.....	126

4. NUCLEAR STRUCTURE AND REACTION MECHANISM

There is no missing isoscalar monopole strenght in ^{58}Ni	129
Configuration Mixing Effects in Isoscalar Giant Dipole Resonance.....	131
Density dependent relativistic Hartree-Fock theory with isovector mesons.....	132
A shell model description of high-spin states in rare earth nuclei.....	133
On Elastic Nucleon Scattering in a Consisten Fermi-Liquid Theory.....	134
New applications of Coulomb dissociation for nuclear astrophysics.....	135

III. Accelerator Division

5. COOLER SYNCHROTRON COSY

Operating Report of COSY in 1998.....	141
---------------------------------------	-----

The ANKE 3-Dipole Insertion in the COSY Ring.....	142
Operation of the tune jump system to preserve polarization at COSY.....	144
Longitudinal Stochastic Cooling Improved by an Optical Notch Filter.....	145
Optimising the Computed Noise for Slow Extraction.....	147
Measurement with the VXI-based Realtime Vectoanalyser.....	149
Considerations for the Design of a New Schottky-Pickup.....	150
Broadband Cavity with Nano-crystalline material VitroPerm.....	151
Status of Application Programs and Accelerator Model.....	154
Magnets, Alignement and New Installations.....	155
Review of Power Converters at the Accelerator Facility COSY.....	156
500 MHz Narrowband Beam Position Monitor System of ELSA.....	157

6. ION SOURCES AND BEAM TRANSPORT

Ion Sources and Low Energy Beam Transport.....	161
Operation of a Double gap Buncher with Complex Waveforms.....	162

7. SPECTROMETER BIG KARL

Magnetic Spectrograph BIG KARL.....	167
NASA Mission Gravity Probe-B – Detector Calibration at BIG KARL.....	168

8. RADIATION PROTECTION

Radiation protection.....	171
---------------------------	-----

IV. EUROPEAN SPALLATION NEUTRON SOURCE (ESS)

9. TARGET PHYSICS

Helium and Hydrogen Production cross sections for 1.2 GeV p+Fe, Au.....	177
Neutron Production in Spallation Target Materials.....	178
Power Density Distribution in a Mercury Target.....	179
The Preparation of a ESS-Target-Moderator-Reflector Mockup.....	180
Validation of Energy Deposition Distribution in Mercury Target by a high Intensity Proton Pulse.....	182
Methods to Calculate Spallation Source Shields and Comparison with Experiments.....	183
Integration of the MC4 Monte Carlo Program into HERMES and further updates to MC4.....	184

10. ACCELERATOR COMPONENTS

A Superconducting Test Modul for the ESS.....	187
Radiation Protection for ESS Prototype-Cavity Experiments.....	188
Design Considerations for a Superconducting Linac as an Option for the ESS.....	191
Accelerator Components for the European Spallation Source ESS	193
Design Study for SC Proton Linac Accelerating Cavities.....	194

V. Technical Developments

11. DATA ACQUISITION; ELECTRONICS; SEMICONDUCTOR DETECTORS; TARGETS

A Data Acquisition System for Small Experiments.....	201
COSY Experiment Data Acquisition and Processing.....	202
Development of High-speed Digital Signal Processing Techniques for Gamma-ray Tracking.....	203
Electronics.....	205

Semiconductor Detectors and Targets.....	206
Cluster targets for COSY.....	207
VI. Scientific Council COSY.....	211
VII. Advisory Committees at COSY.....	211
VIII. Collaborations.....	213
IX. Personnel.....	221
X. Publications.....	229
XI. Index of Authors.....	253