Frontiers in Physics

Vol-2

Editors
G. MURTAZA
M. ASLAM BAIG

SPONSORS:

DR.A.Q.KHAN RESEARCH LABORATORY PAKISTAN ATOMIC ENERGY COMMISSION PAKISTAN SCIENCE FOUNDATION UNIVERSITY GRANTS COMMISSION QUAID-I-AZAM UNIVERSITY.

FRONTIERS IN PHYSICS-II

Proceedings of the Second National Symposium on

Frontiers in Physics
Held at the Department of Physics
Quaid-i-Azam University, Islamabad
26 - 31 December 1988

Edited on Behalf of the Pakistan Physical Society

 $\mathbf{B}\mathbf{y}$

G. Murtaza and M. Aslam Baig Quaid-i-Azam University, Islamabad

PREFACE

The Second National Symposium on Frontiers in Physics was held at the Department of Physics, Quaid-i-Azam University, Islamabad December 26-31, 1988. It was attended by over hundred participants from most of the national universities and research organisations. The programme consisted of lectures and seminars in the mornings and afternoons, followed by special sessions in the evenings. The extended abstracts of fifty four contributed papers were distributed to participants at the beginning of the symposium. The present book contains the manuscripts of the lectures delivered at the symposium.

The symposium was second of its kind to be held in and brought together the physics community to Pakistan share knowledge about latest developments in areas of interest. It provided a unique opportunity to a section of physicists coming from different cross parts of Pakistan to communicate with each other and with lecturers who were chosen for their expertise various disciplines of physics. The hope was to expose our young research worker to new active areas of research and foster mutual interaction and collaboration. The interest

of the participants was evident from the enthusiasm with which they exchanged ideas through out the symposium.

The symposium was jointly sponsored by the Dr.A.Q.Khan Research Laboratories, Pakistan Atomic Energy Commission (PAEC), Pakistan Science Foundation (PSF), University Grants Commission (UGC) and the Quaid-i-Azam University.

The symposium was dedicated to the late Prof.Rafi M.Chaudhary by a unanimous resolution. This was an expression of gratitude felt by the participants for his valuable contributions to develop the Nuclear Research Laboratory at Lahore.

G. Murtaza M.Aslam Baig

Conference Chairman

G.Murtaza (QAU)

Organizing Committee

| K.Ahmad | (QAU) |
|------------------|--------|
| N.M.Butt | (PAEC) |
| Masud Hussain | (QAU) |
| A.H.Nayyar | (QAU) |
| Asghar Qadir | (QAU) |
| M.N.Qazi | (PAEC) |
| M.S.K.Razmi | (QAU) |
| M.Suhail Zubairy | (QAU) |

CONTENTS

| A. | NUCLEAR /COMPUTATIONAL PHYSICS |
|----|--|
| 1. | Role of Sticking Coefficients in Catalytic Reactions |
| | M.A.Khan and Khwaja Yaldram1 |
| 2. | A Method to Find Resonance Parameters for Repulsive Core Potentials |
| | Sohail A.Khan and W.P.Beres12 |
| В. | CONDENSED MATTER PHYSICS |
| 3. | High Temperature (T _c ~90K) Y-Ba-Cu-0 Superconductor |
| | S.M.M.R.Naqvi, J.Alam, Firoz Ahmad and M.Hasan Khan |
| 4. | Processing of Thallium Based High Temperature Superconductors |
| | Gul Afshan, M.Mazhar, Nawazish A.Khan, N.Baber and M.Zafar Iqbal |
| 5. | Defect Studies in Semiconductors-Concepts and Techniques |
| | M.Zafar Iqbal34 |
| 5. | The Precipitation Study by Electrical Resistivity Measurement in Ni-Al Alloys |

| | M.Iqbal Ansari 60 |) |
|-----|---|-----------|
| 7. | Microstructure Studies in Al-Si-Cu-Mg Alloys | |
| | S.Zafar, M.A.Shaikh, K.A.Shoaib and Nazma Ikram69 |) . |
| 8. | Thermodynamics of Non-Equilibrium Phases in Electron Beam Rapid Solidification | |
| | A.Tauqir, F.H.Hashmi and A.Q.Khan78 | , |
| 9. | Cathodoluminescence Studies on Potassium Ion Implanted Cadmium Telluride Single crystals | |
| | Ch.M.Ramzan Tahir89 | |
| 10. | An Introduction to the Physics and Applications of Liquid Crystals | |
| | Nasim Baber10 |)7 |
| C. | ATOMIC, MOLECULAR AND LASER PHYSICS | |
| 11. | Rydberg Atoms | |
| | M.Aslam Baig, A.Rashid, Z.Iqbal, S.Ahmad and S. Mahmood | !C |
| 12. | Photoabsorption Spectrum of BaD Molecule | |
| | Z. Iqbal, M.A.Baig, M.Rafi and M.Aslam Khan14 | 5 |
| 13. | Emission and Absorption by Two Atoms in a Damped Cavity | |
| | Tahira Nasreen15 | 14 |
| 14. | Effect of Vacuum Field Rabi Oscillations on Third Order Non Linear Susceptibility | |
| | Mubeen A.Mir, Tahira Nasreen and M.S.K.Razmi . 16 |) 1 |

| 15. | High Damage Threshold AR-Coating for Nd-YAG Lassers-I:Conventional Systems |
|-----|---|
| | S.M.Javed Akhtar, D.Ristau, J.Ebert and H. Welling |
| W | |
| 16. | High Damage Threshold AC-Coating for Nd:YAG Lasers-II: Inhomogeneous Systems |
| | S.M.Javed Akhtar, F.Mittendorf, H.Schink, D.Ristau, J.Ebert and H.Welling191 |
| 17. | Parametric Study of RF Capacitative Discharges for the Excitation of CO ₂ Gas Lasers |
| | S.M.A.Durrani, S.M.Nasir, S.M.Raza, M.A.Farooqui, P.Vidaud and D.R.Hall202 |
| | |
| D. | PLASMA PHYSICS |
| 18. | Some Aspects of Thermonuclear Fusion |
| | G.Murtaza, F.Nadeem Beg and M.Zakaullah217 |
| 19. | Benjamin-Bona-Mahoney Solitons in a Piezoelectric Semiconductor Plasma |
| | H.A.Shah, N.Ikram and T. Abdullah231 |
| E. | GENERAL TOPICS |
| 20, | Frontiers of Cosmology |
| | Asghar Qadir246 |
| 21. | Neurophysics: A Beginner's View Point |
| | K.A.Siddiqui, S.A.Kamal and N.U.Khan 285 |

List of Participants