

Pramana – journal of physics

CONTENTS – VOLUME 69

(July–December 2007)

Number 1, July

Special issue on

Raychaudhuri equation at the crossroads

Preface	1
A little reminiscence	<i>A K Raychaudhuri</i> 3
A K Raychaudhuri and his equation	<i>J Ehlers</i> 7
On the Raychaudhuri equation	<i>George F R Ellis</i> 15
Singularity: Raychaudhuri equation once again	<i>Naresh Dadhich</i> 23
A singularity theorem based on spatial averages.....	<i>J M M Senovilla</i> 31
The Raychaudhuri equations: A brief review	<i>Sayan Kar</i> <i>and Soumitra SenGupta</i> 49
Black hole dynamics in general relativity	<i>Abhay Ashtekar</i> 77
String theory and cosmological singularities.....	<i>Sumit R Das</i> 93
Horizons in 2+1-dimensional collapse of particles	<i>Dieter Brill,</i> <i>Puneet Khetarpal and Vijay Kaul</i> 109
On the genericity of spacetime singularities	<i>Pankaj S Joshi</i> 119
On a Raychaudhuri equation for hot gravitating fluids	<i>Chandrasekher Mukku, Swadesh M Mahajan and Bindu A Bambah</i> 137
Raychaudhuri equation in quantum gravitational optics	<i>N Ahmadi and M Nouri-Zonoz</i> 147

Number 2, August

Research Articles

Bianchi Type-I, V and VIo models in modified generalized scalar-tensor theory	<i>T Singh and R Chaubey</i> 159
Regge behaviour of distribution functions and t and x -evolutions of gluon distribution function at low- x	<i>U Jamil and J K Sarma</i> 167
$q\bar{q}$ Pair production in non-Abelian gauge fields	<i>S M Puzhakkal and V M Bannur</i> 181
Single-sheet identification method of heavy charged particles using solid state nuclear track detectors	<i>M F Zaki, A Abdel-Naby</i> <i>and A Ahmed Morsy</i> 191

Measurement of mass attenuation coefficients in some Cr, Co and Fe compounds around the absorption edge and the validity of the mixture rule	199
..... <i>U Turgut, O Şimşek and E Büyükkasap</i>	
Collision strengths for transitions in Ni XIX	209
..... <i>K M Aggarwal and F P Keenan</i>	
Single-photon all-optical switching using coupled microring resonators	219
..... <i>Wenge Yang, Amitabh Joshi and Min Xiao</i>	
Nonlinearity management and diffraction management for the stabilization of two-dimensional spatial solitons	229
..... <i>P A Subha, C P Jisha and V C Kuriakose</i>	
Propagation of ion-acoustic waves in a dusty plasma with non-isothermal electrons	241
..... <i>K K Mondal</i>	
Atomic displacements due to interstitial hydrogen in Cu and Pd	255
..... <i>Hitesh Sharma and S Prakash</i>	
Appearance of an inhomogeneous superconducting state in $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ – $\text{YBa}_2\text{Cu}_3\text{O}_7$ – $\text{La}_{0.67}\text{Sr}_{0.33}\text{MnO}_3$ trilayers	267
..... <i>K Senapati and R C Budhani</i>	
Synthesis and characterization of silica–gold core-shell (SiO_2 @Au) nanoparticles	277
..... <i>Deepika Kandpal, Suchita Kalele and S K Kulkarni</i>	
*Hydrogenated nanocrystalline silicon germanium thin films	285
..... <i>A R M Yusoff, M N Syahrul and K Henkel</i>	

Brief Reports

Theoretical approach to the magnetic properties of Mn(II), Cr(III), and Cu(II) complexes in the newly reported 12- and 15-membered macrocyclic ligands	301
..... <i>Ali Bayri and Mustafa Karakaplan</i>	
Equation of state for inert gas solids	307
..... <i>Kamal Devlal and B R K Gupta</i>	
Theoretical explanation of electron paramagnetic resonance and optical parameters for Cu^{2+} ion in LiNbO_3 crystal	313
..... <i>S Ravi and P Subramanian</i>	

Number 3, September

Research Articles

Ray space ‘Riccati’ evolution and geometric phases for N -level quantum systems	317
..... <i>S Chaturvedi, E Ercolessi, G Marmo, G Morandi, N Mukunda and R Simon</i>	
Quality of potential harmonics expansion method for dilute Bose–Einstein condensate	329
..... <i>Anasuya Kundu and Barnali Chakrabarti</i>	
Generalization of quasi-exactly solvable and isospectral potentials	337
..... <i>P K Bera, J Datta, M M Panja and Tapas Sil</i>	
Beta-transition properties for neutron-rich Sn and Te isotopes by Pyatov method	369
..... <i>D I Salamon, S Unlu and N Cakmak</i>	

*Refer the announcement in the Pramana webpage (www.ias.ac.in/pramana)

Background neutron in the endcap and barrel regions of resistive plate chamber for compact muon solenoid/large hadron collider using GEANT4	377
..... <i>J T Rhee, M Jamil, Christopher Joen, Bingzhu Yin and Y J Jeon</i>	
Computation of triple differential cross-sections with the inclusion of exchange effects in atomic K-shell ionization by relativistic electrons for symmetric geometry	387
..... <i>S Dhar and M R Alam</i>	
Optical parametric amplification beyond the slowly varying amplitude approximation	395
..... <i>M Hosseini Farzaad</i>	
Analytical prediction of forced convective heat transfer of fluids embedded with nanostructured materials (nanofluids)	411
..... <i>V Vasu, K Rama Krishna and A C S Kumar</i>	
Gauss law constraints on Debye–Hückel screening	423
..... <i>Ritesh Kumar Dubey, V J Menon, Madhukar Mishra, Mukesh Kumar Pandey and B K Patra</i>	
Variation of long periodicity in blends of styrene butadiene, styrene copolymer/polyaniline using small angle X-ray scattering data	435
..... <i>B G Soares, Fernando G Souza Jr, A Manjunath, H Somashekarappa, R Somashekar and Siddaramaiah</i>	
Temperature variation of higher-order elastic constants of MgO	445
..... <i>K M Raju, R K Srivastava and Kailash</i>	
Electron paramagnetic resonance parameters and local structure for Gd^{3+} in KY_3F_{10}	451
..... <i>Shao-Yi Wu, Hua-Ming Zhang, Guang-Duo Lu and Zhi-Hong Zhang</i>	
Energy resolution methods efficiency depending on beam source position of potassium clusters in time-of-flight mass spectrometer	459
..... <i>Ş Şentürk, F Demiray and O Özsoy</i>	
Role of polyvinyl alcohol in the conductivity behaviour of polyethylene glycol-based composite gel electrolytes	467
..... <i>S K Patel, R B Patel, A Awadhia, N Chand and S L Agrawal</i>	
Brief Reports	
Lifetime measurement of some excited states belonging to the $3p^4n$ ($n=4-6$) configuration of ArII	477
..... <i>S Karmakar and M B Das</i>	
Photoacoustic spectroscopy of thin films of As_2S_3 , As_2Se_3 and GeSe_2	481
..... <i>Seema Kandpal and R P S Kushwaha</i>	
Electrical conduction mechanism of polyvinyl chloride (PVC)–polymethyl methacrylate (PMMA) blend film	485
..... <i>R S Gulalkari, Y G Bakale, D K Burghate and V S Deogaonkar</i>	

Number 4, October

Review Article

Fifty years of Szigeti's dielectric theory – A review	491
..... <i>D B Sirdeshmukh, L Sirdeshmukh and K G Subhadra</i>	

Research Articles

Charmless nonleptonic B decays into scalar and pseudoscalar mesons	<i>B Mawlong</i>	521
Deviation from tri-bimaximal mixings through flavour twistors in inverted and normal hierarchical neutrino mass models	<i>N Nimai Singh, Monisa Rajkhowa and Abhijit Borah</i>	533
Development of 2D particle-in-cell code to simulate high current, low energy beam in a beam transport system.....	<i>S C L Srivastava, S V L S Rao and P Singh</i>	551
Particularization of alpha contamination using CR-39 track detectors	<i>M F Zaki and Y H El-Shaer</i>	567
Perturbative effects on ultra-short soliton self-switching	<i>Amarendra K Sarma and Ajit Kumar</i>	575
Interionic pair potentials and partial structure factors of compound-forming quaternary NaSn liquid alloy: First principle approach	<i>Anil Thakur and P K Ahluwalia</i>	589
Surface segregation of the metal impurity to the (100) surface of fcc metals	<i>Jian-Min Zhang, Bo Wang and Ke-Wei Xu</i>	603
Creation evidence of the second non-dispersive Zakharenko wave by helium atomic beams in superfluid helium-II at low temperatures	<i>A A Zakharenko</i>	617
A variable electron beam and its irradiation effect on optical and electrical properties of CdS thin films	<i>M Singh, Y K Vijay and B K Sharma</i>	631
A general approach to bosonization	<i>Girish S Setlur and V Meera</i>	639
Density of states in an electrically biased quantum well	<i>A Khan, S Sinha and P Panchadhyayee</i>	651
Electron transport through SWNT/ <i>trans</i> -PA/SWNT structure (the role of solitons): A t-matrix technique	<i>S A Ketabi, H Milani Moghaddam and N Shahtahmasebi</i>	661
Neutron response study using poly allyl diglycol carbonate	<i>Basma A El-Badry, M F Zaki, Tarek M Hegazy and A Ahmed Morsy</i>	669

Brief Reports

Normal coordinate analysis and quantum chemical study of tris(<i>p</i> -fluorophenyl)antimony di(<i>N</i> -phenylglycinate) [(<i>p</i> -FC ₆ H ₄) ₃ Sb(O ₂ CCH ₂ NHC ₆ H ₅) ₂]	<i>Tanveer Hasan, P K Singh, K Singhal, P Raj and Neeraj Misra</i>	675
Composition dependence of density of states in a-Se _{100-x} Sn _x thin films	<i>N Sharma, S P Singh and S Kumar</i>	681
Estimation of various scattering parameters and 2-DEG mobilities from electron mobility calculations in the three conduction bands Γ , L and X of gallium arsenide	<i>Sonal Singhal, A K Saxena and S Dasgupta</i>	687

Number 5, November
Special issue on
Proceedings of the
Linear Collider Workshop (LCWS06) – Part I

Foreword	693
Plenary	
The LDC detector concept	<i>Ties Behnke</i> 697
Gamma gamma technology group	<i>Alexander John Finch</i> 703
Physics overview: Introduction to international linear collider physics	<i>Yasuhiro Okada</i> 707
Physics beyond the standard model and cosmological connections: A summary from LCWS06	<i>K Sridhar</i> 719
The road towards the international linear collider: Higgs, top/quantum chromodynamics, loops	<i>S Heinemeyer</i> 727
Forward tracking detectors	<i>Klaus Mönig</i> 735
Higgs and Electroweak Symmetry Breaking	
Photon pairs: Quantum chromodynamics continuum and the Higgs boson ..	<i>Edmond L Berger</i> 743
The standard model Higgs search at the large hadron collider	<i>Satyaki Bhattacharya</i> 749
Little Higgs model effects in $\gamma\gamma \rightarrow \gamma\gamma$	<i>S Rai Choudhury, Ashok Goyal, A S Cornell and Naveen Gaur</i> 753
Charged and neutral minimal supersymmetric standard model Higgs boson decays and measurement of $\tan\beta$ at the compact linear collider	<i>E Coniavitis and A Ferrari</i> 759
Power losses in the international linear collider 20 mrad extraction line at 1 TeV	<i>A Ferrari and Yuri Nosochkov</i> 765
Probing CP-violating Higgs contributions in $\gamma\gamma \rightarrow f\bar{f}$	<i>Rohini M Godbole, Sabine Kraml, Saurabh D Rindani and Ritesh K Singh</i> 771
Anomalous VVH interactions at a linear collider	<i>Sudhansu S Biswal, Debajyoti Choudhury, Rohini M Godbole and Ritesh K Singh</i> 777
Testing the minimal supersymmetric standard model with the mass of the W boson	<i>S Heinemeyer, W Hollik, D Stöckinger, A M Weber and G Weiglein</i> 783
Partially composite two-Higgs doublet model	<i>Dong-Won Jung</i> 789

Probing anomalous Higgs couplings at an $e\gamma$ collider using unpolarised beams	<i>Debajyoti Choudhury and Mamta</i>	795
Search for Higgs boson in beyond standard model scenarios at large hadron collider	<i>Kajari Mazumdar</i>	801
Associated single photons and doubly-charged scalars at linear e^-e^- colliders	<i>Biswarup Mukhopadhyaya and Santosh Kumar Rai</i>	809
Identifying new physics contributions in the Higgs sector at linear e^+e^- col- liders	<i>Santosh Kumar Rai</i>	815
Higgs self-coupling in the fusion channel at the international linear collider	<i>K Moenig and A Rosca</i>	819
SUSY Particles		
Phenomenology of non-universal gaugino masses and implications for the Higgs boson decay	<i>K Huitu, J Laamanen, P N Pandita and Sourov Roy</i>	823
Low-scale gravity mediation in warped extra dimension and collider phenom- enology on hidden sector	<i>H Itoh, N Okada and T Yamashita</i>	829
Model-independent approach for dark matter phenomenology: Signatures in linear colliders and cosmic positron experiments	<i>Shigeki Matsumoto and Nobuchika Okada</i>	835
Top squark and neutralino decays in a R -parity violating model constrained by neutrino oscillation data	<i>Sujoy Poddar</i>	839
Testing the supersymmetric QCD Yukawa coupling in a combined LHC/ILC analysis	<i>A Freitas and P Z Skands</i>	843
New Physics at TeV Scale and Electroweak Precision Test		
Probing space-time structure of new physics with polarized beams at the international linear collider	<i>B Ananthanarayan</i>	849
Signals of universal extra dimension at the international linear collider	<i>Biplob Bhattacharjee</i>	855
Higher-order corrected Higgs bosons in FeynHiggs2.4	<i>T Hahn, S Heinemeyer, W Hollik, H Rzehak, G Weiglein and K Williams</i>	861
Extra dimension searches at hadron colliders to next-to-leading order-QCD	<i>M C Kumar, Prakash Mathews and V Ravindran</i>	871
Distinguishing new physics scenarios with polarized electron and positron beams	<i>A A Pankov, N Paver and A V Tsytrinov</i>	877
Transverse polarization in $\gamma Z, HZ$ production	<i>Saurabh D Rindani</i>	883
Higher curvature effects in Arkani-Hamed–Dimopoulos–Dvali and Randall– Sundrum models	<i>T G Rizzo</i>	889
Event-shape of dileptons plus missing energy at a linear collider as a supersymmetry/Arkani-Hamed–Dimopoulos–Dvali discriminant	<i>Probir Roy</i>	895

Probing universal extra dimension at the international linear collider	
..... <i>Gautam Bhattacharyya</i>	903
Littlest Higgs model and W pair production at international linear collider	
..... <i>P Poulose</i>	909
Top and Quantum Chromodynamics	
Lepton distribution in top decay: A probe of new physics and top-polarization	
..... <i>Rohini M Godbole, Saurabh D Rindani and Ritesh K Singh</i>	915
Scalar top study: Detector optimization	
..... <i>C Milstène and A Sopczak</i>	921
$\gamma\gamma e^-e^-$ Physics	
Measuring Higgs CP properties through top quark production at a photon collider	
..... <i>Eri Asakawa</i>	927
Heavy neutral MSSM Higgs bosons at the photon linear collider – a comparison of two analyses	
..... <i>M Spira, P Nieżurawski, M Krawczyk and A F Żarnecki</i>	931
Photon collider beam simulation with CAIN	
..... <i>Aleksander Filip Żarnecki</i>	937
Loop Calculations	
Results from GRACE/SUSY at one-loop	
..... <i>J Fujimoto, T Ishikawa, M Jimbo, T Kaneko, T Kon, Y Kurihara, M Kuroda, Y Shimizu and Y Yasui</i>	943
Electroweak precision data and gravitino dark matter	
..... <i>S Heinemeyer</i>	947
List of Participants	i

Number 6, December

Special issue on

Proceedings of the Linear Collider Workshop (LCWS06) – Part II

Foreword

$\gamma\gamma e^-e^-$ Technology

Meeting to discuss laser cavity design for photon linear collider – Daresbury, UK, 10 January 2006	
..... <i>Alexander John Finch</i>	953
Ultimate parameters of the photon collider at the international linear collider	
..... <i>V I Telnov</i>	957

Tracking and Vertexing

CMOS monolithic pixel sensors research and development at LBNL	
..... <i>D Contarato, J-M Bussat, P Denes, L Greiner, T Kim, T Stezelberger, H Wieman, M Battaglia, B Hooberman and L Tompkins</i>	963

Status on the development of front-end and readout electronics for large silicon trackers	<i>J David, M Dhellot, J-F Genat, F Kapusta, H Lebbolo, T-H Pham, F Rossel, A Savoy-Navarro, E Deumens, P Malisse, D Fougeron, R Hermel, Y Karyotakis and S Vilalte</i>	969
Preliminary thoughts on the data acquisition for the next generation of silicon tracking systems	<i>J F Genat and A Savoy-Navarro</i>	977
A beam test of prototype time projection chamber using micro-pattern gas detectors at KEK	<i>Makoto Kobayashi</i>	981
Studies on the drift properties and spatial resolution using a microMEGAS-equipped time projection chamber	<i>Rosario L Reserva, Dennis C Arogancia, Angelina M Bacala, Khalil Boudjemline, Dan Burke, Paul Colas, Madhu Dixit, Arnaud Giganon, Ioannis Giomataris, Hermogenes C Gooc Jr, Yukihiro Kato, Keisuke Fujii, Hiroyuki Fujishima, Masahiro Habu, Takatoshi Higashi, Makoto Kobayashi, Hirotoshi Kuroiwa, Vincent Lepeltier, Takeshi Matsuda, Osamu Nitoh, Kirsten Sachs, Ronald Dean Settles, Akira Sugiyama, Philippe Rosier, Sachio Matsushita, Keiichi Nakamura, Takashi Watanabe, Atsushi Yamaguchi, Hiroshi Yamaoka and Thomas Zerguerras</i>	989
Small visible energy scalar top iterative discriminant analysis	<i>A Sopczak, A Finch, A Freitas, C Milt��ne and M Schmitt</i>	995
Linear Collider Flavour Identification status report: Sensors for the International Linear Collider	<i>K D Stefanov</i>	1001
Monolithic CMOS pixel detector for international linear collider vertex detection	<i>J E Brau, O Igonkina, N Sinev, D Strom, C Baltay, W Emmet, H Neal and D Rabinowitz</i>	1009
Calorimetry and Muons		
Preliminary results from India-based Neutrino Observatory detector R&D programme	<i>Sarika Bhide, V M Datar, Satyajit Jena, S D Kalmani, N K Mondal, G K Padmashree, B Satyanarayana, R R Shinde and P Verma</i>	1015
An electromagnetic calorimeter for the silicon detector concept	<i>J E Brau, R E Frey, D Strom, M Breidenbach, D Freytag, N Graf, G Haller, R Herbst, J Jaros, T Nelsen, V Radeka, B Holbook, R Lander, M Tripathi and Y Karyotakis</i>	1025
CALICE scintillator hadron calorimeter prototype commissioning and calibration	<i>J Cvach</i>	1031
The 4th concept detector	<i>John Hauptman</i>	1037
Muon identification and pion rejection in the 4th concept	<i>John Hauptman</i>	1047

Systematic studies of small scintillators for new sampling calorimeter	
..... <i>E P Jacosalem, S Iba, N Nakajima, H Ono,</i>	
..... <i>A L C Sanchez, A M Bacala and H Miyata,</i>	1051
Software studies of GLD calorimeter	<i>H Matsunaga</i> 1057
CALICE silicon–tungsten electromagnetic calorimeter	
..... <i>G Mavromanolakis</i>	1063
Understanding the performance of CMS calorimeter	<i>Seema Sharma</i> 1069
Evolution of the dual-readout calorimeter	<i>Aldo Penzo</i> 1075
Development of MPPC	<i>Tohru Takeshita</i> 1079
Silicon detector technology development in India for the participation in in-	
ternational experiments	<i>Anita Topkar, S Praveenkumar,</i>
..... <i>Bharti Aggarwal, S K Kataria and M D Ghodgaonkar</i>	1085
Simulation and Reconstruction	
Software for the international linear collider: Simulation and reconstruction	
frameworks	<i>Ties Behnke and Frank Gaede</i> 1089
Investigations into properties of charge traps created in CCDs by neutron and	
electron irradiation	<i>James E Brau,</i>
..... <i>Olga Igonkina, Nikolai B Sinev and Jan Strube</i>	1093
Calorimeter energy calibration using the energy conservation law	
..... <i>Vasily L Morgunov</i>	1097
Particle flow calorimetry at the international linear collider	
..... <i>Mark A Thomson</i>	1101
Event reconstruction with MarlinReco at the International Linear Collider	
..... <i>O Wendt, F Gaede and T Krämer</i>	1109
Performance of GLD detector	<i>T Yoshioka</i> 1115
Machine Detector Interface	
New final doublets and power densities for the international linear collider	
small crossing angle layout	<i>R Appleby and P Bambade</i> 1119
The impact of BeamCal performance at different international linear collider	
beam parameters and crossing angles on $\tilde{\tau}$ searches	
..... <i>P Bambade, V Drugakov and W Lohmann</i>	1123
The interaction region of the large detector concept	<i>K Buesser</i> 1129
International linear collider simulations using BDSIM	
..... <i>J Carter, I Agapov, G A Blair and O Dadoun</i>	1133
The stabilisation of final focus system	<i>P A Coe,</i>
..... <i>D Urner and A Reichold</i>	1137
Study of charged and neutral minimal supersymmetric standard model Higgs	
boson decays and measurement of $\tan\beta$ at the compact linear collider	
..... <i>E Coniavitis and A Ferrari</i>	1141

A laser-wire system for the International Linear Collider		
.....	<i>Nicolas Delerue, Sudhir Dixit, Fred Gannaway, David Howell, Myriam Qurshi, Grahame Blair, Stewart Boogert, Gary Boorman, Chafik Driowichi, Lawrence Deacon, Alexander Aryshev, Pavel Karataev, Nobuhiro Terunuma, Junji Urakawa, Axel Brachmann, Joe Frisch and Marc Ross</i>	1147
Fast and precise luminosity measurement at the international linear collider	<i>C Grah</i>	1151
The stimulated Breit–Wheeler process as a source of background e^+e^- pairs at the international linear collider	<i>A Hartin</i>	1159
The E166 experiment: Development of an undulator-based polarized positron source for the international linear collider	<i>J Kovermann, A Stahl, A A Mikhailichenko, D Scott, G A Moortgat-Pick, V Gharibyan, P Pahl, R Pöschl, K P Schüller, K Laihem, S Riemann, A Schälicke, R Dollan, H Kolanoski, T Lohse, T Schweizer, K T McDonald, Y Batygin, V Bharadwaj, G Bower, F-J Decker, C Hast, R Iverson, J C Sheppard, Z Szalata, D Walz, A Weidemann, G Alexander, E Reinherz-Aronis, S Berridge, W Bugg and Y Efrimenko</i>	1165
Study on low-energy positron polarimetry	<i>A Schälicke, G Alexander, R Dollan, K Laihem, T Lohse, S Riemann, P Starovoitov and A Ushakov</i>	1171
The lay-out of the photon collider at the international linear collider	<i>V I Telnov</i>	1177
Detector issues for a photon collider	<i>Klaus Mönig</i>	1181
Data Acquisition and Global Detector Network		
Data acquisition in the EUDET project.....	<i>J Mnich and M Wing</i>	1185
Very forward calorimeters readout and machine interface	<i>Wojciech Wierba</i>	1191
Detector and trigger challenge for supersymmetrical dark matter scenarios at the international linear collider	<i>Z Zhang</i>	1195
New developments of the R&D silicon tracking for linear collider on silicon trackers	<i>A Savoy-Navarro</i>	1199
Physics issues on triggering	<i>Klaus Mönig</i>	1207
Test Beams		
Test-beam programs for devices to measure luminosity and energy and optimize the luminosity	<i>W Lohmann</i>	1209
Concluding remarks	<i>Rohini M Godbole</i>	1215
List of Participants		1221

Volume Contents

xi

Subject Index of Volume 69	1227
Author Index of Volume 69	1237
Contents of Volume 69	i
Information for Contributors	