

FORMAT FOR THE 97th ANNUAL REPORT
University of Delhi

[1st April 2019 - 31st March 2020]

1. Major activities and Achievements

The department maintained its position as the topmost university physics department in the country in the QS rankings. It sustained its high quality research as evidenced by about 340 research publications (SCOPUS only) by its faculty and students in international refereed journals during the year. With nearly 600 MSc students and over 180 PhD students along with presently available about 41 faculty members, the department is one of the largest physics departments in the country. Its faculty received several national and international grants and participated in several collaborative projects across the globe. The department hosted various eminent researchers from all over the world, who gave inspiring lectures to motivate our young students. The department conducted an extensive exercise to revise its masters curriculum providing a wide choice of electives including inter-disciplinary subjects to its students. An exclusive departmental portal, displaying regular updates on its academic and other activities, successfully went online during the year.

2. Honours/Distinctions

PROF. BRAJESH CHANDRA CHOUDHARY

- [1] Member, CMS Finance Board (2017-2019).
- [2] Member, CMS Management Board (2018 - 2020).
- [3] Spokesperson, India-CMS Collaboration, August 2017 – August 2021.
- [4] Spokesperson, Indian Institutions - Fermilab Collaboration in Neutrino Physics, 2019 –2024.
- [5] Member, expert committee of Department of Science and Technology (DST), Govt. of India, for reviewing research projects for award of scientific grants.
- [6] Member, selection committee for appointment of University Professor at Aligarh Muslim University.

PROF. AMITA CHANDRA

- [1] Member, University Research Council, Manav Rachna University, 5/4/2019 - 4/4/2021.
- [2] UGC Nominee-Advisory Committee SAP (DSA-II, 01/4/2015-31/3/2020), Department of Physics, Mohanlal Sukhadia University, Udaipur.
- [3] Member, Board of Studies, School of Vocational Studies and Applied Sciences, Gautam Buddha University. Greater Noida.
- [4] DAAD Research Ambassador (2014 onwards).

PROF. DEBAJYOTI CHOUDHURY

- [1] Member, PAC (High Energy Physics, Nuclear Physics, Astrophysics, Plasma Physics and Nonlinear Dynamics) of the DST.
- [2] DST committee for SERC School in THEP.
- [3] Member, selection Committee for INSPIRE Faculty Awards.

- [4] Member, selection Committee for UGC-FRP.
- [5] Member, selection Committees for several national institutions.
- [6] Member, Institutional Peer Review Committees for several institutions.
- [7] Member, organizing committees for several national and international conferences and workshops.

PROF. PATRICK DAS GUPTA

- [1] President, Indian association of general relativity and gravitation (IAGRG) – 2020 onwards.
- [2] Member, Department Research Committee of the Deptt. of Physics, Indira Gandhi National Tribal University, Amarkantak, Chhattishgarh.
- [3] Member of the UG Board of Studies in Physics, Pondicherry University, Puducherry.

PROF. VINAY GUPTA

- [1] Vice Chairman, Semiconductor Society of India (SSI), 2015 - 19.
- [2] Coordinator, Centre for Advanced Studies (CAS-I), Dept. of Physics & Astrophysics, Univ. of Delhi, 2018 – 23.
- [3] Member (2018-22), Technical Review & Advisory committee(TRAC) for DeitY project “Nanoelectronics Network for research & Applications” implemented by IISc, IITs (Bombay, Madras, Delhi, Kharagpur) in area of “Energy & Environment”.
- [4] Expert Member (13-6-2019 to 12-6-2021), Post Graduate board of studies and Research in Physics, Ch. Devilal University, Sirsa, Haryana.
- [5] Member (2018-21), School Board, School of Physical & Mathematical Sciences, Central University of Haryana.
- [6] Member (2018-21), School Board, School of Physical & Mathematical Sciences, Central Univ.of Haryana.

PROF. SAMIT KR MANDAL

- [1] Member: Board of Studies" (BOS), Amity Institute of Nuclear Science & Technology, Amity University, Noida.
- [2] Member (2018 -2019) P.G. Board of Studies and research, Indira Gandhi University Meerpur, Rewari, (Haryana).
- [3] Member, “Committee for updating equivalent discipline for recruitment”, Defence Research & Development Organization (DRDO), New Delhi (2018 – till date).
- [4] Member, Planning Committee of SERB School on Nuclear Physics (2018 - till date).
- [5] Member, NUSTAR Council (with voting right), FAIR-NUSTAR project, GSI, Darmstadt, Germany (2018 – till date).
- [6] Co-convenor, FAIR-NUSTAR-INDIA Collaboration (2017 – till date).
- [7] Member, Expert committee of SERB for High Risk High Reward Research (HRHR) (2017 - till date).
- [8] Member Selection Committee, National Council Of Educational Research & Training Sri Aurobindo Marg, New Delhi (2019).
- [9] Member, “Special Committee of “Special Centre for Nanoscience (SCNS)”, Jawaharlal Nehru University, New Delhi.
- [10] Member, several Selection committees for JRF/Research Associate/Scientist, Inter-University Accelerator Center, New Delhi.
- [11] Member, evaluation Committee for JRF to SRF, Inter-University Accelerator Center, New Delhi
- [12] External Member as IUAC nominee for JRF/Project Assistance selection committee, Special Centre for Nanoscience (SCNS)”, Jawaharlal Nehru University, New Delhi.

- [13] External Member as IUAC nominee for JRF/Project Assistance selection committee, University School Of Basic And Applied Sciences, G.G.S Indraprastha University, New Delhi.
- [14] Local coordinator for FAIR, Mega science Exhibition at Delhi 2019, Vigyan Samagam.

PROF. SHYAMA RATH

- [1] Member, PAC (High Energy Physics, Nuclear Physics, Astrophysics, Plasma Physics and Nonlinear Dynamics) of the DST.
- [2] Member of the PG Board of Studies, Dept. of Physics, Pondicherry University, Puducherry.
- [3] Member, Departmental Research Committee, Delhi Technological University.
- [4] Member, Selection Committee of KVPY.
- [5] Member, Selection Committee for CSIR-SRF and RA.
- [6] Member, Evaluation Committee of DST PhD Inspire Awards.

PROF. H.P. SINGH

- [1] Member, DST-JSPS India-Japan Science Council (2016 – till date),
- [2] Chair, Time Allocation Committee, Indian Institute of Astrophysics, Bengaluru (2018 – till date),

PROF. ANNAPOORNI SUBRAMANIAM

- [1] Member, Academic council, Jawaharlal Nehru University, Pondicherry University and Amity Institute of Nanotechnology.
- [2] Local coordinator, GIAN.

DR. AWADHESH PRASAD

- [1] Member, PAC (High Energy Physics, Nuclear Physics, Astrophysics, Plasma Physics and Nonlinear Dynamics) of the DST.

DR. SOURAV SUR

- [1] Member, Indian association of general relativity and gravitation (IAGRG).
- [2] Recipient of OUTSTANDING REVIEWER AWARD 2019, Classical and Quantum Gravity, Institute of Physics Publishing, Bristol, United Kingdom.

3. Publications [Total number: 340]

Research Papers published till 31 March 2020

- 1) Ahmed, A., Gola, M., Kumar, A. & Naimuddin, M. 2020, "Development and qualification of triple-GEM detector built with large size single mask foils produced in India", *Journal of Instrumentation*, vol. 15, no. 2.
- 2) Ansari, M.A. & Sreenivas, K. 2020, "Detection of rhombo-ortho-tetra-cubic phase transitions on poled Er³⁺ and Sn⁴⁺ doped BaTiO₃ ceramics by up-conversion luminescence", *Materials Letters*, vol. 264.
- 3) Aydemir, U., Mandal, T. & Mitra, S. 2020, "Addressing the RD (*) anomalies with an S1 leptoquark from SO(10) grand unification", *Physical Review D*, vol. 101, no. 1.
- 4) Batra, K., Sinha, N. & Kumar, B. 2020, "Lead-free 0.95(K_{0.6}Na_{0.4})NbO₃-0.05(Bi_{0.5}Na_{0.5})ZrO₃ ceramic for high temperature dielectric, ferroelectric and piezoelectric applications", *Journal of Alloys and Compounds*, vol. 818.
- 5) Bhukkal, S. & Kumar, B. 2020, "Modified CZ technique for the growth of organic crystals having low melting point and high vapour pressure", *Journal of Crystal Growth*, vol. 535.

- 6) Boazbou Newmai, M., Pathak, N.K. & Senthil Kumar, P. 2020, "Molecular aspects of oligomer-coupled ultra-small Au nanoparticles", *Journal of Physics and Chemistry of Solids*, vol. 140.
- 7) Chakraborty, S., Sharma, H.P., Tiwary, S.S., Majumder, C., Banerjee, P., Ganguly, S., Rai, S., Popli, P., Modi, S., Arumugam, P., Singh, M., Kumar, S., Kumar, A., Bhattacharjee, S.S., Singh, R.P., Muralithar, S. & Palit, R. 2020, "Signature splitting in the positive parity bands of ^{127}Xe ", *European Physical Journal A*, vol. 56, no. 2.
- 8) Chakraborty, S., Sharma, H.P., Tiwary, S.S., Majumder, C., Banerjee, P., Ganguly, S., Rai, S., Pragati, Mayank, Kumar, S., Kumar, A., Palit, R., Bhattacharjee, S.S., Singh, R.P. & Muralithar, S. 2020, " γ -vibration in ^{126}Xe : A revisit", *Nuclear Physics A*, vol. 996.
- 9) Chakraborty, S., Sharma, H.P., Tiwary, S.S., Majumder, C., Banerjee, P., Ganguly, S., Rai, S., Pragati, Muralithar, S., Singh, R.P., Bhattacharjee, S.S., Kumar, S., Mayank, Kumar, A. & Palit, R. 2020, "Possible antimagnetic rotational band in ^{127}Xe ", *Journal of Physics G: Nuclear and Particle Physics*, vol. 47, no. 1.
- 10) Dubey, M., Kumar, A., Murugavel, S., Prakash, G.V., Jose, D.A. & Mariappan, C.R. 2020, "Structural and ion transport properties of sodium ion conducting Na_2MTeO_6 (M= MgNi and MgZn) solid electrolytes", *Ceramics International*, vol. 46, no. 1, pp. 663-671.
- 11) Dutt, M., Kaushik, A., Tomar, M., Gupta, V. & Singh, V. 2020, "Synthesis of mesoporous α - Fe_2O_3 nanostructures via nanocasting using MCM-41 and KIT-6 as hard templates for sensing volatile organic compounds (VOCs)", *Journal of Porous Materials*, vol. 27, no. 1, pp. 285-294.
- 12) Gangopadhyay, A., Misra, K., Hiramatsu, D., Wang, S.-., Hosseinzadeh, G., Wang, X., Valenti, S., Zhang, J., Howell, D.A., Arcavi, I., Anupama, G.C., Burke, J., Dastidar, R., Itagaki, K., Kumar, B., Kumar, B., Li, L., McCully, C., Mo, J., Pandey, S.B., Pellegrino, C., Sai, H., Sahu, D.K., Sanwal, P., Singh, A., Singh, M., Zhang, J., Zhang, T. & Zhang, X. 2020, "Flash Ionization Signatures in the Type Ibc Supernova SN 2019uo", *Astrophysical Journal*, vol. 889, no. 2.
- 13) Gill, N., Gupta, V., Tomar, M., Sharma, A.L., Pandey, O.P. & Singh, D.P. 2020, "Improved electromagnetic shielding behaviour of graphene encapsulated polypyrrole-graphene nanocomposite in X-band", *Composites Science and Technology*, vol. 192.
- 14) Goel, S. & Kumar, B. 2020, "A review on piezo-/ferro-electric properties of morphologically diverse ZnO nanostructures", *Journal of Alloys and Compounds*, vol. 816.
- 15) Goel, S., Sinha, N., Yadav, H., Joseph, A.J., Hussain, A. & Kumar, B. 2020, "Optical, piezoelectric and mechanical properties of xylenol orange doped ADP single crystals for NLO applications", *Arabian Journal of Chemistry*, vol. 13, no. 1, pp. 146-159.
- 16) Gupta, G., Sharma, R. & Seshadri, T.R. 2020, "Scalar spectral index in the presence of Primordial Black Holes", *International Journal of Modern Physics D*, vol. 29, no. 3.
- 17) Gupta, R., Gupta, V. & Tomar, M. 2020, "Ferroelectric PZT thin films for photovoltaic application", *Materials Science in Semiconductor Processing*, vol. 105.
- 18) Gupta, R.K., Kar, S. & Nitish, R. 2020, "Aspects of gravitational wave/particle duality: Bulk torsion boundary gravity correspondence", *International Journal of Modern Physics D*, vol. 29, no. 2.
- 19) Gupta, S., Paliwal, A., Gupta, V. & Tomar, M. 2020, "Ferroelectric $\text{Sr}_0.6\text{Ba}_0.4\text{Nb}_2\text{O}_6$ thin film based broadband waveguide coupled surface plasmon electro-optic modulator", *Optics and Laser Technology*, vol. 122.
- 20) Gupta, S., Paliwal, A., Gupta, V. & Tomar, M. 2020, "Surface Plasmon Resonance assisted optical analysis of Strontium Barium Niobate thin films", *Applied Surface Science*, vol. 501.
- 21) Halder, K.K., Tomar, M., Sachdev, V.K. & Gupta, V. 2020, "Carbonized Charcoal-Loaded PVDF Polymer Composite: A Promising EMI Shielding Material", *Arabian Journal for Science and Engineering*, vol. 45, no. 1, pp. 465-474.
- 22) Hussain, A., Sinha, N., Joseph, A.J., Goel, S., Singh, B., Bdikin, I. & Kumar, B. 2020, "Mechanical investigations on piezo-/ferroelectric maleic acid-doped triglycine sulphate single crystal using nanoindentation technique", *Arabian Journal of Chemistry*, vol. 13, no. 1, pp. 1874-1889.
- 23) Jain, C., Saumya, S., Jain, G., Dalal, R., Agrawal, N., Bhardwaj, A. & Ranjan, K. 2020, "Modeling of neutron radiation-induced defects in silicon particle detectors", *Semiconductor Science and Technology*, vol. 35, no. 4.

- 24) Jain, S., Paliwal, A., Gupta, V. & Tomar, M. 2020, "Long Range Surface Plasmons assisted highly sensitive and room temperature operated NO₂ gas sensor", *Sensors and Actuators, B: Chemical*, vol. 311.
- 25) Jain, S., Paliwal, A., Gupta, V. & Tomar, M. 2020, "Plasmon-Assisted Crystalline Silicon Solar Cell with TiO₂ as Anti-Reflective Coating", *Plasmonics*, .
- 26) Jamdegni, M. & Kaur, A. 2020, "Highly efficient dark to transparent electrochromic electrode with charge storing ability based on polyaniline and functionalized nickel oxide composite linked through a binding agent", *Electrochimica Acta*, vol. 331.
- 27) Joseph, A.J., Sinha, N., Goel, S., Hussain, A. & Kumar, B. 2020, "True-remanent, resistive-leakage and mechanical studies of flux grown 0.64PMN-0.36PT single crystals", *Arabian Journal of Chemistry*, vol. 13, no. 1, pp. 2596-2610.
- 28) Joshi, A., Pandey, J.C., Raj, A., Singh, K.P., Anupama, G.C. & Singh, H.P. 2020, "Optical and X-ray studies of three polars: RX J0859.1+0537, RX J0749.1-0549, and RX J0649.8-0737", *Monthly Notices of the Royal Astronomical Society*, vol. 491, no. 1, pp. 201-214.
- 29) Kingston, S.L., Suresh, K., Thamilmaran, K. & Kapitaniak, T. 2020, "Extreme and critical transition events in the memristor based Liénard system", *European Physical Journal: Special Topics*, vol. 229, no. 6-7, pp. 1033-1044.
- 30) Krishna, S., Kumar, R. & Malik, R.P. 2020, "A massive field-theoretic model for Hodge theory", *Annals of Physics*, vol. 414.
- 31) Kumar, A., Sudipta & Murugavel, S. 2020, "Influence of textural characteristics on biomineralization behavior of mesoporous SiO₂-P₂O₅-CaO bioactive glass and glass-ceramics", *Materials Chemistry and Physics*, vol. 242.
- 32) Kumar, P., Saxena, N. & Gupta, V. 2020, "Vital role of Ar ambient pressure in controlled properties of nanocrystalline CdS thin films", *Journal of Materials Science: Materials in Electronics*, .
- 33) Kumar, R., Jain, H., Sriram, S., Chaudhary, A., Khare, A., Ch, V.A.N. & Mondal, D.P. 2020, "Lightweight open cell aluminum foam for superior mechanical and electromagnetic interference shielding properties", *Materials Chemistry and Physics*, vol. 240.
- 34) Kumar, S., Arora, A., Mishra, P. & Mahapatro, A.K. 2020, "Nanofiber Network Formation by 50 keV Ar⁺-Ion Irradiation on GaSb Surface", *Integrated Ferroelectrics*, vol. 205, no. 1, pp. 81-87.
- 35) Kumar, S. & Gupta, D.N. 2020, "Optimization of laser parameters for proton acceleration using double laser pulses in TNSA mechanism", *Laser and Particle Beams*, .
- 36) Kumar, S., Sinha, N., Goel, S. & Kumar, B. 2020, "Effect of xylenol orange dye on morphological, optical, piezo-/di-electric and mechanical properties of potassium hydrogen phthalate single crystals", *Vacuum*, vol. 175.
- 37) Malik, C., Kaur, N., Singh, B. & Pandey, A. 2020, "Luminescence properties of tricalcium phosphate doped with dysprosium", *Applied Radiation and Isotopes*, vol. 158.
- 38) Malik, C., Meena, R.K., Rathi, P., Singh, B. & Pandey, A. 2020, "Effect of dopant concentration on luminescence properties of a phosphor K₂CaPO₄: Dy", *Radiation Physics and Chemistry*, vol. 168.
- 39) Malik, C., Pandey, A. & Singh, B. 2020, "Optical Properties of Nano-Crystalline Potassium Calcium Phosphate Doped with Dy", *Integrated Ferroelectrics*, vol. 204, no. 1, pp. 73-80.
- 40) Malik, S., Chand, H. & Seshadri, T.R. 2020, "Role of Intervening Mg II Absorbers on the Rotation Measure and Fractional Polarization of the Background Quasars", *Astrophysical Journal*, vol. 890, no. 2.
- 41) Mandlik, N.T., Rondiya, S.R., Dzade, N.Y., Kulkarni, M.S., Sahare, P.D., Bhatt, B.C. & Dhole, S.D. 2020, "Thermoluminescence, photoluminescence and optically stimulated luminescence characteristics of CaSO₄:Eu phosphor: Experimental and density functional theory (DFT) investigations", *Journal of Luminescence*, vol. 221.
- 42) Mandlik, N.T., Sahare, P.D. & Dhole, S.D. 2020, "Effect of size variation and gamma irradiation on thermoluminescence and photoluminescence characteristics of CaSO₄:Eu micro- and nanophosphors", *Applied Radiation and Isotopes*, vol. 159.

- 43) Mandlik, N.T., Varma, V.B., Kulkarni, M.S., Bhatt, B.C., Sahare, P.D., Raut, S.A., Mathe, V.L., Bhoraskar, S.V. & Dhole, S.D. 2020, "Luminescence and dosimetric characteristics of nanocrystalline Al₂O₃:C synthesized by thermal plasma reactor", *Nuclear Instruments and Methods in Physics Research, Section B: Beam Interactions with Materials and Atoms*, vol. 466, pp. 90-101.
- 44) Mangla, O., Roy, S., Annapoorni, S. & Asokan, K. 2020, "A study on defect annealing in GaAs nanostructures by ion beam irradiation", *Bulletin of Materials Science*, vol. 43, no. 1.
- 45) Mukherjee, R., Jaiswal, S., Shukla, M.K., Hakim, A. & Thomas, E. 2020, "Measurement of temperature of a dusty plasma from its configuration", *Contributions to Plasma Physics*, .
- 46) Neelam, Kumar, S., Devi, K.R., Kumar, N., Saha, S., Biswas, S., Singh, P., Babra, F.S., Laskar, M.S.R., Palit, R., Samanta, S., Das, S., Kumar, A. & Srivastava, P.C. 2020, "Intermediate structure and dipole bands in the transitional Ba 134 nucleus", *Physical Review C*, vol. 101, no. 1.
- 47) Negi, S. & Chandra, A. 2020, "Aqueous electrolytes' transport through nanopores of polymeric membrane", *Radiation Effects and Defects in Solids*, vol. 175, no. 3-4, pp. 257-267.
- 48) Pandey, A.K., Natwariya, P.K. & Bhatt, J.R. 2020, "Magnetic fields in a hot dense neutrino plasma and the gravitational waves", *Physical Review D*, vol. 101, no. 2.
- 49) Puri, N., Gupta, R.K., Pattanaik, A.K., Tandon, R.P., Padmavati, M.V.G. & Mahapatro, A.K. 2020, "Materials Characterization of Cobalt Antimonide Nanostructures as Thermoelectric Material", *Integrated Ferroelectrics*, vol. 205, no. 1, pp. 66-71.
- 50) Rajak, D.K., Wagh, P.H., Menezes, P.L., Chaudhary, A. & Kumar, R. 2020, "Critical Overview of Coatings Technology for Metal Matrix Composites", *Journal of Bio- and Tribo-Corrosion*, vol. 6, no. 1.
- 51) Rawal, R., Kharangarh, P.R., Dawra, S., Tomar, M., Gupta, V. & Pundir, C.S. 2020, "A comprehensive review of bilirubin determination methods with special emphasis on biosensors", *Process Biochemistry*, vol. 89, pp. 165-174.
- 52) Sachdeva, D. & Sadhukhan, S. 2020, "Discussing 125 GeV and 95 GeV excess in light radion model DISCUSSING 125 GeV and 95 GeV EXCESS in LIGHT ... DIVYA SACHDEVA and SOUMYA SADHUKHAN", *Physical Review D*, vol. 101, no. 5.
- 53) Saini, R., Kumar, A., Bhatt, G., Kapoor, A., Paliwal, A., Tomar, M. & Gupta, V. 2020, "Lossy Mode Resonance-Based Refractive Index Sensor for Sucrose Concentration Measurement", *IEEE Sensors Journal*, vol. 20, no. 3, pp. 1217-1222.
- 54) Saxena, S., Bagchi, S., Tayyab, M., Rao, B.S., Kumar, S., Gupta, D.N. & Chakera, J.A. 2020, "Scaling up and parametric characterization of two-color air plasma terahertz source", *Laser Physics*, vol. 30, no. 3.
- 55) Sharma, A., Gupta, G. & Das, T.D. 2020, "Dielectric Parameters Study of GaAs_{1-x}Sb_x Alloy from Optical Interband Transition", *Journal of Electronic Materials*, vol. 49, no. 5, pp. 3149-3155.
- 56) Sharma, A., Yadav, K., Shrimali, M.D., Prasad, A. & Kuznetsov, N.V. 2020, "Time varying feedback control on multi-stability in hidden attractor", *European Physical Journal: Special Topics*, vol. 229, no. 6-7, pp. 1245-1255.
- 57) Simon, A. & Naqvi, F. 2020, "Indirect determination of neutron-capture cross sections for Sm isotopes", *Physical Review C*, vol. 101, no. 1.
- 58) Singh, A.K., Dawra, D., Dimri, M., Jha, A.K.S., Pandey, R.K. & Mohan, M. 2020, "Plasma screening effects on the atomic structure of He-like ions embedded in strongly coupled plasma", *Physics Letters, Section A: General, Atomic and Solid State Physics*, vol. 384, no. 12.
- 59) Singh, A.K., Dawra, D., Dimri, M., Jha, A.K.S., Sharma, R. & Mohan, M. 2020, "Relativistic photoionization cross section calculations and resonance parameters for Mg-like Se XXIII", *Radiation Physics and Chemistry*, vol. 168.
- 60) Singh, P., Ram, J., Chauhan, V., Nambissan, P.M.G., Gupta, S.K., Kumar, S., Sharma, S.K., Sahare, P.D. & Kumar, R. 2020, "High dose gamma radiation exposure upon Kapton-H polymer for modifications of optical, free volume, structural and chemical properties", *Optik*, vol. 205.

- 61) Singh, V., Late, D.J. & Rath, S. 2020, "Tunable light emission from chemical vapor deposited two-dimensional MoSe₂ by layer variation and S incorporation", *Journal of Vacuum Science and Technology A: Vacuum, Surfaces and Films*, vol. 38, no. 2.
- 62) Sonker, R.K., Yadav, B.C., Gupta, V. & Tomar, M. 2020, "Synthesis of CdS nanoparticle by sol-gel method as low temperature NO₂ sensor", *Materials Chemistry and Physics*, vol. 239.
- 63) Suleman, M., Deraman, M., Hashmi, S.A., Othman, M.A.R., Kumar, Y., Rajouria, S.K. & Jasni, M.R.M. 2020, "Accommodating succinonitrile rotators in micro-pores of 3D nano-structured cactus carbon for assisting micro-crystallite organization, ion transport and surplus pseudo-capacitance: An extreme temperature supercapacitor behavior", *Electrochimica Acta*, vol. 333.
- 64) Sundari, S.S., Kumar, B. & Dhanasekaran, R. 2020, "Dielectric and conductivity properties of flux grown Ce doped NBT-BT single crystals", *Physica B: Condensed Matter*, vol. 582.
- 65) Wadhawan, D. & Das, S. 2020, "Dissipation and quantum noise in chiral circuitry", *Physica E: Low-Dimensional Systems and Nanostructures*, vol. 121.
- 66) Waikar, M.R., Raste, P.M., Sonker, R.K., Gupta, V., Tomar, M., Shirsat, M.D. & Sonkawade, R.G. 2020, "Enhancement in NH₃ sensing performance of ZnO thin-film via gamma-irradiation", *Journal of Alloys and Compounds*, vol. 830.
- 67) Waikar, M.R., Sonker, R.K., Gupta, S., Chakarvarti, S.K. & Sonkawade, R.G. 2020, "Post- γ - irradiation effects on structural, optical and morphological properties of chemical vapour deposited MWCNTs", *Materials Science in Semiconductor Processing*, vol. 110.
- 68) Yadav, I., Jain, S., Lamba, S.S., Tomar, M., Gupta, S., Gupta, V., Jain, K.K., Dutta, S. & Chatterjee, R. 2020, "Effect of growth and electrical properties of TiO_x films on microbolometer design", *Journal of Materials Science: Materials in Electronics*, .
- 69) Yadav, N., Ritu, Promila & Hashmi, S.A. 2020, "Hierarchical porous carbon derived from eucalyptus-bark as a sustainable electrode for high-performance solid-state supercapacitors", *Sustainable Energy and Fuels*, vol. 4, no. 4, pp. 1730-1746.
- 70) Yadav, N., Yadav, N. & Hashmi, S.A. 2020, "Ionic liquid incorporated, redox-active blend polymer electrolyte for high energy density quasi-solid-state carbon supercapacitor", *Journal of Power Sources*, vol. 451.
- 71) Bala, N., & **Rath, S.**, "Effect of Oxygen Annealing on the Growth and Magnetic behavior of Sol-Gel Synthesized NiO Nanoparticles", *Materials Today Proc.*
<https://doi.org/10.1016/j.matpr.2020.02.605> .
- 72) Pandey, R.K., Mishra, P., Kaushik, J.K., Pandey, A., Raman, R., Devarani, D., & Rath, S., "*Higher electrical activation of ion-implanted Si over S in GaSb epitaxial layers*", *Material Science in Semiconductor Processing* **115** 105107.

Research Papers published between 1 April – 31 December 2019

1. Abdelaziz, A.H.M., Kumar, P. & Sarma, A.K. 2019, "Effective focusing of a diverging atomic beam by a sequence of alternatively chirped few-cycle pulsed laser fields", *Physical Review A*, vol. 99, no. 2.
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Books / Chapters published between 1 April 2019 – 31 March 2020

1. Prof. P. Das Gupta, 'Three faces of Aharonov-Bohm Phase', in Lectures on Quantum Mechanics: Fundamentals and Applications, eds. Anirban Pathak and Ajoy Ghatak (Viva Books Pvt. Ltd., 2019).
 2. Prof. P. Das Gupta, 'Artificial Intelligence, Free Will, Physics and all that useless ruminations', Echo (Physics Journal, St. Stephens College), 6-8, March Issue (2019).
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3. Prof. N. Deo, 'Evolution and dynamics of the currency market', Pradeep Bhadola and N. Deo, New Economic Windows, Chapter in book, 2019.
 4. Prof. S. Mahajan, 'Higher Education in the Sciences in India', Indian Science Education, Edited by S. Irfan Habib and Dhruv Raina, 2019.
 5. Dr. S. K. Kar, 'Non-commutative Geometry: A Perspective on String and Field Theories', World Scientific, Singapore, 2019.
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4. Journals

PROF. SANJAY JAIN:

- [1] Member of the Editorial Board of Theory in Biosciences (Elsevier).
- [2] Member of the Editorial Board of Artificial Life (MIT Press).

DR. AWADHESH PRASAD:

- [1] Editor: Chaos, Solitons and Fractals (Elsevier Science).
- [2] Editorial Board Member: Pramana - J. Physics (Indian Academy of Science).

5. Research Projects

Name of the Principle Investigator	Title of the project and duration	Funding Agency
Prof. Sanjay Jain	Pre-evolutionary processes in autocatalytic RNA networks 2018 - 2021	CEFIPRA (Indo-French)
	Centre of Excellence in Genome Sciences and Predictive Medicine (Phase II) 2015-2020	DBT
Prof. B.C. Choudhary	Indian Institutions-Fermilab Collaboration in neutrino physics" 2019 - 2024	DST
Prof. S. Annapoorni	"Magneto-Optic and Plasmonic Response in magnetic core-shell structures and magnetic multilayers 2017 - 2020	SERB -DST
Prof. H.P. Singh	Galactic & Extragalactic Archeology using Variable Stars" 2019-2022	CSIR
	Indo-US Joint Networked Center "Theoretical Analyses of Variable Star Data in the Era of Large Surveys" 2018-2020	DST (Indo-US joint network)
Prof. Vinay Gupta	Fabrication of Lamb Wave Devices on SiO ₂ /Si 2019 - 2024	ER&IPR
	Optimization of TiO _x film and patterning of the polymer (PI-2610) as sacrificial layer for pixel fabrication 2018 - 2029	DRDO
	Feasibility study for fabrication of Air bridges by gold electroplating	DRDO

	2017 – 2019	
<i>Prof. T. R. Seshadri</i>	<i>Magnetic Fields as Probes for Astrophysical Phenomena</i> 2017 - 2020	SERB-DST
<i>Prof. Binay Kumar</i>	<i>Fabrication and characterization of piezoelectric nanocrystals-organic hybrid sheet for energy harvesting and pressure sensor.</i> 2016 - 2019	SERB-DST
<i>Prof. Nivedita Deo</i>	<i>Functional Domains and Site Correlation Networks in Evolving Protein Families</i> 2017 - 2020	SERB - DST
<i>Prof. Amarjeet Kaur</i>	<i>“Low Cost Energy Saving Electrochromic Devices Based on Nanostructured Conducting Polymers for Energy Storing Smart Windows</i> 2017 -2020	SERB-DST
<i>Prof. Amita Chandra</i>	<i>Polymer composites for energy devices: Structure-property relationship</i> 2017-2020	Funded by Alexander von Humboldt Foundation, Germany
<i>Prof. Samit K Mandal</i>	<i>Multi-nucleon transfer reaction dynamics and its effect on fusion near the Coulomb barrier for medium mass nuclei</i> 2019 - 2022	SERB-DST
	<i>Investigation of few-nucleons transfer and fusion reactions mechanism in medium mass nuclei at and near the Coulomb barrier</i> 2015 -2019	IUAC (UGC)
<i>Prof. S.A. Hasmi</i>	<i>Development of Flexible-Solid-State Capacitors based on Sodium Ion Conducting Gel Polymer Electrolytes</i> 2017 - 2020	SERB -DST
<i>Dr. Awadhesh Parsad</i>	<i>Understanding the perpetual points in nonlinear dynamical systems</i> 2017 -2020	SERB-DST
<i>Dr Suresh Kumar</i>	<i>Search for large Octupole collectivity and high-spin near N=126 shell closure</i> 2019 - 2022	UGC-DAE-CRS Kolkata
	<i>Investigation of the high spin states in the A=85 mass region using In-beam gamma-ray spectroscopy</i> 2017- 2020	IUAC - UGC
<i>Dr. Ashok Kumar</i>	<i>R&D of GEM detectors for Scientific and Medical Applications</i> 2015 - 2019	DST
<i>Dr. S.K. Chamoli</i>	<i>Search for Quadrupole and Octupole collectivity in nuclei of mass A~150 region</i> 2019 - 2022	SERB-DST
<i>Dr. Jyoti Rajput</i>	<i>Exploring molecular growth of hydrocarbons in slow (energy 1 keV or less) ion-molecule collisions</i> 2019 - 2020	SERB-DST
<i>Dr. Ashutosh Bhardwaj</i>	<i>Simulation studies and tests to develop radiation tolerant</i>	SERB-DST

	<i>silicon detectors for High luminosity colliders, 2017 - 2020</i>	
<i>Dr. Ajit Mahapatro</i>	<i>Investigation of Thermoelectric(TE) Properties of Calcium Cobalt Oxide (Ca₃Co₄O₉) and Graphene Derivatives (as nano-inclusions) for TE Generator Applications 2017 - 2019</i>	<i>SSPL- DRDO</i>
<i>Dr. Debabrata Mishra</i>	<i>To Design and Develop a novel spin controlled chiral quantum dot DNA bio-sensor 2019 - 2022</i>	<i>SERB-DST</i>
	<i>Development of spin dependent smart electrode for DNA bio-sensor. 2019 - 2022</i>	<i>IMPRINT 2, MHRD-DST+ Industry</i>
	<i>UGC Start-up grant for faculties joined under Faculty Recharge Program 2018 - 2019</i>	<i>UGC</i>
<i>Dr Sumalay Roy</i>	<i>Depth resolved investigations of microstructures of metal/ topological insulator interfaces 2020 - 2023</i>	<i>UGC-DAE CSR and RRCAT (Indore)</i>
	<i>Growth of periodic multi- bi-layer structures of high Z metals on the surface of three dimensional topological insulators 2019 - 2022</i>	<i>SERB-DST</i>
	<i>UGC Start-up grant for faculties joined under Faculty Recharge Program 2018 - 2019</i>	<i>UGC</i>

6. Patents Filed/Granted

NIL

7. Seminars Organized

- Total Number :28 + 18 (by Students)
- Details of Maximum 10
- Single line space between two entries
- Name of Speaker, Designation and Affiliation, Title of Talk, Date

International:

Sr. No.	Date	Topic	Speaker/Affiliation
1	19.02.2020	Probing Fundamental Physics and Cosmology with Gravitational Waves	<i>Prof. Martin Hendry</i> University of Glasgow
2	24.02.2020	Compartmentalized RNA replicator dynamics relevant for origin of life	<i>Prof. Philippe Nghe</i> CNRS---ESPCI ParisTech, Paris, France
3.	6.03.2020	Quantum information using integrated photonics	<i>Dr. Jasleen Lugani</i>

			Friedrich Schiller Universitat, Jena, Germany
4	24.01.2020	Searching for non-unitary neutrino oscillations in the present T2K and NovA data	<i>Dr. Ushak Rahaman</i> University of Johannesburg
5	15.01.2020	<i>Generalized Spin Fluctuation Feedback in Heavy Fermion Superconductors</i>	Adil Amin, University of Wisconsin, USA
6	17.01.2020	Concomitant Magnetic Memory Effect in CrO ₂ – Cr ₂ O ₃ Core-Shell Nanorods	<i>Dr. Ashish Chhaganlal Gandhi</i> , National Dong Hwa University, Taiwan
7	13.01.2020	Deconfined quantum criticality in the cuprate high temperature superconductors	<i>Prof. Subir Sachdev</i> , Harvard University
8	12.04.2019	Seeing is Believing: Experimental Insights about Supercooled Liquids, Glasses & Controlled Crystallization	<i>Dr. Chandan K Mishra</i> , University of Pennsylvania
9	5.09.2019	Silicon Sensor and Mechanics R&D towards the ATLAS Inner Tracker at the High Luminosity LHC	<i>Abhishek Sharma</i> , Oxford University & CERN
10	5.09.2019	Low energy tests of fundamental symmetries at CERN	<i>Dr. Michael Doser</i> , Spokesperson, AEGIS expt. at CERN
11	18.10.2019	Recent Developments in μ - τ Symmetry	<i>Dr. Newton Nath</i> , Institute of High Energy Physics, Beijing
12	23.10.2019	Neutron scattering in condensed matter: a case study in hybrid materials	<i>Dr. Mohandoss Viswanathan</i> , Queen Mary University of London, and Indian Institute of Science, Bengaluru
13	1.10.2019	Challenges of Landing on the Moon and Mars	<i>Ann Devereaux</i> , Systems Engineering Division NASA Jet Propulsion Laboratory California, USA
14	06.09.2019	Rare earth doped III-nitride Semiconductor Nanostructures for spintronic and optoelectronic applications	<i>Prof. Ratnakar Palai</i> , University of Puerto Rico, San Juan
15	14.08.2019	A brief history of time crystals	<i>Prof. Shivaji Sondhi</i> , Princeton University
16	6.08.2019	Resolving the accretion flow in nearby AGN using the EHT and GMVA	<i>Dr. Bidisha Bandyopadhyay</i> , Universidad de Concepcion, Chile
17	2.08.2019	FAIR progress and NUSTAR physics opportunities	<i>Dr. Juergen Gerl</i> <i>NUSTAR Technical Coordinator</i> , FAIR Facility for Antiproton and Ion Research in Europe, GSI, Darmstadt (Germany)

National:

Sr. No.	Date	Topic	Speaker/Affiliation
1	8.11.2019	Subregion-subregion duality and paradoxes	<i>Dr. Nirmalya Kajuri,</i> Hennai Mathematical Institute
2	05.11.2019	Why should physicists think about biology?	<i>Prof. Gautam I Menon,</i> Ashoka University, Sonapat and Institute of Mathematical Sciences, Chennai
3	17.10.2019	Why do we need a quantum theory of gravity?	Prof. Spenta R. Wadia Professor Emeritus and Founding Director International Centre for Theoretical Sciences-TIFR Bangalore
4	23.09.2019	Manipulating Atoms by Light	<i>Prof. Rupamanjari Ghosh,</i> Vice-Chancellor, Shiv Nadar University
5	17.09.2019	Evolution of Human Cognition	<i>Prof. L.S. Shashidhara</i> President, Int. Union of Biological Sciences, IISER, Pune and Ashoka University
6	30.08.2019	Thermal and non-thermal dark matter phenomenology	<i>Sreemanti Chakraborti,</i> Indian Institute of Technology, Guwahati
7	08.08.2019	Chemically Driven Magic Clusters	<i>Prof. Pawan Kumar Khanna,</i> Defence Institute of Advanced Technology, Pune
8	17.05.2019	Is photon really massless?	<i>Prof. T.R. Govindarajan,</i> Institute of Mathematical Sciences, Chennai
9	8.05.2019	Nanomagnetism in dots & antidot lattices	<i>Prof. Subhankar Bedanta,</i> NISER, Bhubaneswar
10	30.04.2019	Loop Quantum Gravity: An Overview	<i>Prof. Madhavan Varadarajan,</i> Raman Research Institute, Bengaluru
11	1.4.2019	Chance ki Baat	<i>Prof. Ram Ramaswamy,</i> IIT, Delhi Former President, Indian Academy of Science, Bengaluru Former Vice Chancellor, Hyderabad Central University

8. Conferences Organized

(Data not available)

9. Seminar/Conference Presentations (National/International) (only invited talks)

PROF. BRAJESH CHANDRA CHOUDHARY

- [1] The Elusive Neutrinos: What do we know about it & what more we want to know Invited Institute Colloquium: NISER, Bhubaneswar, 21. October. 2019
- [2] India-CMS Collaboration at CERN: What we do, How we do, Why we do, & What have we done? Swissnex India, Bangalore, 4 September, 2019
- [3] Neutrinos, Recent Results from Neutrino Experiments & Future Prospects A Workshop on Neutrino Physics: Theory and Experiment, BHU – Varanasi, 19. October. 2019
- [4] Understanding the Fundamental Constituents of the Universe: Brick by Brick National Seminar on Nuclear, Particle & Accelerator Physics, Organized by NASI, Delhi Chapter & Kalindi College, D.U, 6. November. 2019

PROF. NIVEDITA DEO

- [1] Perspectives in Nonlinear Dynamics (PNLD 2019), 16 July-19 July 2019, ICTP-SAIFR, São Paulo, Brasil, Talk: Evolution and Dynamics of World Currency Network.
- [2] 27th International Conference on Statistical Physics (StatPhys 27), 8 July – 12 July 2019, UCA Puerto Madero, Buenos Aires, Argentina, Talk: Functional Domains in Proteins.

PROF. BINAY KUMAR

- [1] Inaugural Lecture on “Crystals and Nanoparticles for Piezoelectric Energy Harvesting” as Chief Guest in Quantum 2019-20, Shyam Lal College DU, 23-24 Oct 2019
- [2] Invited Talk “Low Cost Modified Czochralski Technique for Organic Crystals: Growth, Characterization and Application” and Poster “Flux Growth of PMN-PT Single Crystals: True Remanant and Resistive Leakage Investigations” International Conference on Crystal Growth and Epitaxy ICCGE-19/OMVPE-19 Keystone, CO, USA, from July 28–August 2, 2019. Represented India in EC and GB meeting of IOCG. 22
- [3] Invited Talk “Crystals for Society, Science and Technology” in National Science Seminar on “Future India: Science & Technology” (NSFIST 2019) Munger University 3-4 April, 2019.

PROF. SAMIT KR MANDAL

- [1] *Inelastic excitations and multi-neutron transfer channels effect on sub-barrier fusion enhancement*, Centenary Celebration Conference on Nuclear structure and Nuclear Reactions, Department of Physics, Aligarh Muslim University, Aligarh, UP, March 2nd -4th, 2020. Talk derived on 3rd March 2020)
- [2] *Femto Physics & FAIR*, Mega science exhibition, Vigyan Samagam, National Science Centre, New Delhi FAIR WEEK, 11th -15th February 2020 (Talk derived on 15th February 2020)
- [3] *Physics with NUSTAR facilities at FAIR*, Mega science exhibition, Vigyan Samagam, National Science Centre, New Delhi FAIR WEEK, 11th -15th February 2020 (Talk derived on 13th February. 2020)

- [4] *Femto Physics: searching a needle in a haystack*, National Seminar on Nuclear, Particle and Accelerator Physics on Wednesday, November 06, 2019 at Kalindi College, New Delhi
- [5] *Nuclear Physics at FAIR*, Mega science exhibition, Vigyan Samagam, Visvesvaraya Industrial & Technological Museum, Bengaluru, 29th July to 28th September, 2019 (Talk derived on 6th Sept. 2019)
- [6] *Gamma Tracking Array: A new generation high resolution gamma ray spectrometer for exotic nuclear structure studies*, 64th DAE-BRNS Symposium on Nuclear Physics Special Session “Future Facilities and Scope for Nuclear Physics Research in the Country” University of Lucknow, Lucknow, Uttar Pradesh December 23-27, 2019 (Talk derived on 23rd Dec. 2019)
- [7] *Exploring the exotic nuclei using radioactive and stable beams*, DAE-BRNS Theme Meeting on “Nuclear Reactions involving Weakly Bound Stable and Radioactive Ion Beams” December 1-3, 2019 at DAE Convention Centre Auditorium B, Anushaktinagar, Mumbai (Talk derived on 2nd Dec. 2019)
- [8] *A spectrometer for transfer reaction studies*, DAE-BRNS Theme Meeting on “Nuclear Reactions involving Weakly Bound Stable and Radioactive Ion Beams” December 1-3, 2019 at DAE Convention Centre Auditorium B, Anushaktinagar, Mumbai (Talk derived on 3rd Dec. 2019)
- [9] *Interplay of inelastic excitations and transfer channels on the enhancement of sub-barrier fusion cross section*, New Frontiers in Nuclear Physics (ICNFNP19)” at Banaras Hindu University during October 14-17, 2019, (Talk derived on 16th Oct. 2019)
- [10] *Critical usage of erbium for radiation shielding for advanced applications*, 21st International Conference on surface modification of Materials by ion beams 25th -30 August 2019, Tomsky, Russia, (Talk derived on 26th August 2019).

PROF. SHYAMA RATH

- [1] “Optical spectroscopic protocols for emerging material systems”, Department of Physics, Jamia Millia Islamia, 7th March, 2020. (Invited)
- [2] “Spectroscopic Ellipsometry of Metal Oxide thin films” Department of Physics, IIT Guwahati 19th December, 2019 (Invited)
- [3] “Tunable Band Gap and Thermal Conductivity Measurements of Monolayer MoSe₂ by S Incorporation” AVS 66th International Symposium & Exhibition, Ohio, USA American Vacuum Society October 22, 2019.

DR. AWADHESH PRASAD

- [1] An introduction to perpetual points in nonlinear dynamical systems and its applications Recent Advances in Nonlinear Mechanics Lodz University of Technology, Lodz, Poland, May 7-10, 2019.

DR. ASHOK KUMAR

- [1] RPC Performance with HARDROC based Readout, 21st International Workshop on Radiation Imaging Detectors (iWoRiD 2019) July 7-12, 2019, Kolymbari, Chania, Crete (Greece).

DR. MD. NAIMUDDIN

- [1] The status of gaseous detector R&D – Invited talk at the SQU-CMS Detector and Physics workshop, April 08-10, 2019, Sultan Qaboos University, Muscat, Oman.

10. National/International MoUs Signed

- With Indian/Foreign Universities
- With Indian/Foreign Companies/Industry

11. Other Inter-Institutional Collaboration

International Collaboration

- An Indo-US joint networked Center “Theoretical Analysis of Variable Star Data in the era of Large Surveys” was sanctioned by the Indo-US Science and Technology Forum with Nodal PI **Prof. H. P. Singh**. The other partners are the State University of New York at Oswego, Yale university and IUCAA.
- Indo-US Project with Nodal Institute as Delhi University (**PI: Prof. H. P. Singh**) and SUNY (Oswego), Texas A & M University, University of Florida at Gainesville and IUCAA (Pune) as partner Institutes.
- Country-wide collaboration on Compact Muon Solenoid (CMS) experiment in High Energy physics with National (TIFR, SINP, BARC, etc.) and International (CERN, Fermilab, DESY etc.) institution (**Prof. B.C. Choudhary, Prof. K. Ranjan, Dr. Ashok Kumar, Dr. A. Bhardwaj, Dr. Md. Naimuddin**).
- Prof. A.P. Freundorfer and Prof. Michael Sayer, Queen`s University, Kingston, Canada (**Prof. Vinay Gupta**).
- Prof. Saurya Das, Theoretical Physics Group, Department of Physics and Astronomy, University of Lethbridge, Alberta, Canada (**Dr. Sourav Sur**).

Prof. Samit Mandal collaborates with

- PRESPEC collaboration: GSI, Germany, An Inter-institutional and multi-country collaboration.
- AGATA collaboration: European collaboration, An Inter-institutional and multi-country collaboration.
- FAIR collaboration: GSI, Germany, An Inter-institutional and multi-country collaboration.

National Collaboration

- INO Collaboration: India, Inter-institutional collaboration (**HEP group**).
- INGA collaboration: Inter-institutional collaboration (**Prof. Samit Mandal, Dr. Suresh Kumar**).
- Collaborative work between DU and IGCAR. (**Prof. Sevi Murugavel**).
- Prof. Ratnamala Chatterjee, IIT Delhi (**Prof. Vinay Gupta**).
- Dr. A. Kapoor, Solid State Physics Laboratory (DRDO), Delhi (**Prof. Vinay Gupta**).
- Dr. Govind Gupta and Dr. Ashok Kumar, National Physical Laboratory, Delhi (**Prof. Vinay Gupta**).

12. Students under Exchange Programme

Information not available

13. Placement Details (Number and percentage of students placed)

Information Not Available.

14. Extension and Outreach Activities

- a) Organization of Mega Science project exhibition by the faculty members at New Delhi from January to March 2020.
- b) Participation of Mega Science project exhibitions at Mumbai, Kolkata and Bengaluru by the faculty members

15. Number of M.Phil./Ph.D. Degrees Awarded

Ph.D : 18

M.Phil: Nil

16. Other Significant Information

- Annual Raman Ramkumar memorial award in computational physics for meritorious MSc students.