DR. SANJEEV KUMAR
Assistant Professor
Department of Physics
GGDSD COLLEGE Chandigarh
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DOB: 10th October 1975

Educational Qualifications

Ph.D. in Experimental Radiation Physics
Department of Physics, Panjab University Chandigarh, India (2009)
PhD Thesis: *Study of inner-shell vacancy decay and photon-atom scattering processes in the x-ray energy region*, Ph.D. Supervisors: (Prof.) Nirmal Singh and (Prof.) Devinder Mehta
Qualified C.S.I.R. (J. R. F.) in Physical Science
M.Sc. (Physics) - Department of Physics, Guru Nanak Dev University, Amritsar, India.
Bachelor of Arts (with English) D.A.V. College, Jalandhar City, India.

Teaching/Research Experience

- 20 July 2013- till date
  Assistant Professor in Department of Physics, GGDSD College,Chandigarh
  Teaching Mathematical Physics, Nuclear Physics, Computational Physics, Statistical Mechanics, Atomic and Molecular Physics, Experimental Techniques in Physics at Post-graduate level, and Optics and Laser, Electricity and Magnetism at UG Level
- 28 August 2010- 19 July 2013
  Assistant Professor in Department of Applied Science, Chitkara University, Punjab. Taught Engineering Physics and research in the field of Nanotechnology.
- 26 August 2008- 30 April 2010
  Lecturer in Medical Physics in Department of Physics, Panjab University, Chandigarh.
  Teaching Radiation Physics and practical classes for the PG students in Medical physics and M Sc. II Physics and B.Sc (Hons. School) I year – Electricity and Magnetism.
- 01 January 2003 to 31 December 2004
  CSIR-Junior Research Fellow in Department of Physics, Panjab University, Chandigarh.
- 01 January 2004 to 31 December 2007
  CSIR-Senior Research Fellow in Department of Physics, Panjab University, Chandigarh.
- 24 August 2019- 03 March 2000
  Lecturer in Physics in D. A. V. College Jalandhar City, Punjab. Teaching Electronics and Nuclear Physics.

Areas of Interest

- Experimental Radiation Physics
- Medical Physics
- Material Science

Publications (Journal/Book Chapters)

Journal Publications:

1. **Large angle elastic and inelastic scattering of 14.93 keV photons**.
   Prem Singh, D. Mehta**,** S. Kumar, M. Sharma, S. Puri, J. S. Shahi and Nirmal Singh.
   Nucl. Instrum. and Meth. B 222 (2004) 1-10.

2. **Probabilities for radiative vacancy transfer from L_i (i = 1, 2, 3) sub-shells to the M, N and higher shells for elements with $77 \leq Z \leq 92$.**
   Manju Sharma, Sanjeev Kumar, Prem Singh, Sanjiv Puri and Nirmal Singh.
   Journal of Physics and Chemistry of Solids, 66 (2005) 2220-2222.

3. **Diffrential scattering cross-section measurements for elastic and inelastic scattering of 17.44 keV photons**.
   Prem Singh, Sanjeev Kumar, J. Goswamy, D. Mehta and N. Singh.
   Nucl. Instrum. and Meth. B. 224 (2006) 295-302.

4. **An EDXRF study of the photodecomposition of diorganyl ditellurides.**
   Manju Sharma, K.K.Bhasin, S.K.Mehta, Nirmal Singh and Sanjeev Kumar.
   Rad. Phys. Chem. 75 (2006) 2029-2038.

5. **M_ξ,$M_{\alpha\beta}$,M_γ and M_m X-ray fluorescence cross-sections for elements with $71 \leq Z \leq 90$.**
   Nirmal Singh, Manju Sharma, Veena Sharma, Sanjeev Kumar and S.Puri.
   Rad. Phys. Chem 75 (2006) 1503-1509.

6. **Rayleigh, Compton and K-shell radiative resonant Raman scattering in $_{83}$Bi for 88.03 keV γ- rays.** Sanjeev Kumar, Veena Sharma,,D.Mehta and Nirmal Singh.
   Nucl. Instrum.. and Meth. B (NIMB) 264 (2007) 1-8.

7. **Alignment of Mi (i=1-5) subshell vacancy states in $_{79}$Au, $_{83}$Bi, $_{90}$Th and $_{92}$U following photoionization by unpolarized Mn K x-rays.**
   Sanjeev Kumar, Veena Sharma, D. Mehta and Nirmal Singh.
   Physical Review A 77 (2008) 032510.

8. **L_i (i = 1-3) subshell vacancy decay processes for the elements with $52 \leq Z \leq 57$ following ionization using Mn $K\alpha$ x rays.**
   Veena Sharma, Sanjeev Kumar, D. Mehta and Nirmal Singh.
   Physical Review A 78 (2008) 12507.

9. **Resonant Raman scattering contribution to attenuation of x-rays having energy in lower vicinity of K-shell ionization threshold of element with $22 \leq Z \leq 92$.**
   Sanjeev Kumar, Veena Sharma, D. Mehta and Nirmal Singh.
   Journal of applied Physics 105 (2008) 104909.

10. **Elastic scattering measurements in elements with $22 \leq Z \leq 92$ for 59.54 keV γ-rays at momentum transfer x = 0.4 - 4.7 Å.**
    Sanjeev Kumar, Veena Sharma, J.S. Shahi, D. Mehta and Nirmal Singh.
    European Physical Journal D 55, (2009) 23-33.

11. **Contribution of near-edge processes to attenuation of the characteristic x rays in element with $48 \leq Z \leq 92$.**
    Sunil Kumar, Sanjeev Kumar, S.C. Bedi, D. Mehta and Nirmal Singh.
    Nucl. Instrum. and Meth. B. 268 (2010) 431-439.

12. **Influence of resonant Raman scattering in the elemental analysis using X-ray emission based techniques.**
    Sunil Kumar, Gurjeet Singh, **Sanjeev Kumar**, D. Mehta and Nirmal Singh
    Nucl. Instrum. and Meth. B, 268 (2010) 2437-2445.

13. **Elemental analysis of ground water from different region of Punjab state (India) using EDXRF technique and the source of water contamination**
    Atul Bhalla, Gurjeet Singh, **Sanjeev Kumar**, J.S. Shahi and D. Mehta.
    International proceeding of Chemical, Biological & Environmental Engineering (IPCBEE), 9 (2011) 156-164.

14. **Study of Uranium Contamination of Ground Water in Punjab using X-ray fluorescence technique.**
    Muhanad Alrakabi, Gurjeet Singh, Atul Bhalla, Sunil Kumar, **Sanjeev Kumar**, Alok Srivastava, Bimal Rai, N. Singh, J.S. Shahi and D. Mehta.
    Journal of Radioanalytical and Nuclear Chemistry, DOI 10.1007/s10967-011-1585-X, 2011.

15. **Synthesis, characterization and photo-catalytic activity of the samarium doped ZnS nanoclusters**
    Mansi Chitkara, Kanesh Kumar, Karamjit Singh **Sanjeev Kumar** and I.S. Sandhu
    Journal of optoelectronics and Biomedical materials, 4 (2012) 79-85.

16. **Alignment of L_3 subshell vacancy states in $_{79}$Au, $_{83}$Bi, $_{90}$Th and $_{92}$U following photoionization.**
    Mohanad Alrakabi, Sanjeev Kumar,Gurjeet Singh, Veena Sharma and Devinder Mehta
    Eur. Phys. J. D (2013) DOI:10.1140/epjd/e2013-30356-7

17. **Reply to query related to ''Study of uranium contamination of ground water in Punjab state in India using X-ray fluorescence technique".**
    G. Singh, A. Bhalla, S. Kumar, M. Alrakabi, S. Kumar, A. Srivastava, B. Rai, N. Singh, J. S. Shahi, D. Mehta
    Journal of Radioanalytical and Nuclear Chemistry, DOI 10.1007/s10967-013-2450-x.

18. **A calibration method for patient specific IMRT QA using a single therapy verification film.**
    Arvind Kumar Shukla, Arun S. Onam, Sanjeev Kumar, I.S. Sandhu and S.C. Sharma
    Reports of Practical Oncology & Radiotherapy, Volume 18, Issue 4, July–August 2013, Pages 235-240

19. **Photoluminiscence and Photo-Catalytic activity of synthesized nanocrystals.**
    Mansi Chitkara, Khanesh Kumar, Sanjeev Kumar and I S Sandhu.
    Journal on Today's Ideas -Tomorrow's Technologie, Vol. 1, No. 1June 2013 pp. 15–28.

20. **Elemental analysis of nanomaterial using photon-atom interaction based EDXRF technique.**
    Sanjeev Kumar, Arun Kumar, Mansi Chitkara, Khanesh Kumar, I S Sandhu and D. Mehta.
    Journal of Nuclear Physics, Material sciences. Radiation and applications.Vol. 1, No. 1June 2013 pp. 61–70.

21. **Improvement in IMRT dose calculation with penumbral corrected AAA algorithm using film dosimetry.**
    Arvind Kumar Shukla, Sanjeev Kumar, I.S. Sandhu, A.S. Oinam, Ranjit Singh and Gaurav Trivedi.
    International journal of scientific research 12 (2013) 2.

22. **Photocatalytical, optical and magnetic properties of Fe-doped ZnO nanoparticles prepared by chemical route.**
    Kanesh Kumar, Mansi Chitkara, Sanjeev Kumar and I.S. Sandhu
    Journal of Alloys and compounds, 588 (2014) 681-689.

23. **Photocatalytic and magnetic properties of $Zn_{1-x}Cr_xO$ nanoparticles prepared by the co-precipitation method**
    Kanesh Kumar, Mansi Chitkara, Sanjeev Kumar and I.S. Sandhu
    Materials Science in Semiconductor Processing 30 (2015) 142–151.

24. **Synthesis, characterization and antimicrobial activity of Manganese and Iron doped Zinc oxide nanoparticles.**
    Neha Sharma, Savita Jandaik, Sanjeev Kumar, Mansi Chitkara and I.S. Sandhu
    Journal of Experimental nanoscience 11 (2016) 54-71.

25. **Elemental analysis of condiments, food addatives and edible salts using X-ray fluorescence technique.**
    Heena Duggal, Atul Bhalla, Sanjeev Kumar, J.S. Shahi, and D. Mehta.
    Int. J. Pharm. Sci. Rev. Res. 35 (2015) 2.

26. **Synergistic activity of doped zinc oxide nanoparticles with antibiotics: ciprofloxacin, ampicillin, fluconazole and amphotericin B against pathogenic**

microorganisms.
N Sharma, S Jandaik, S. Kumar
Anais Da Academia Brasileira De Ciências 88 (3), 1689-1698

27. **Dosimetric study of beam angle optimization in intensity-modulated radiation therapy planning.**
Arvind Kumar Shukla, Sanjeev Kumar, I.S. Sandhu, A.S. Oinam, Ranjit Singh and Rakesh Kapoor.
Journal of Cancer Research and Therapeutics, 12 (2016) 2.

28. **Measurements of $KL_{2,3}$ in case of $_{24}Cr$ and $L_2M_{4,5}$ in case of $_{59}Pr$ differential radiative RRS cross-sections using Mn Kα X-rays.**
Veena Sharma, Arun Upmanyu, Ranjit Singh, Gurjot Singh, Hitesh Kumar, D. Mehta and Sanjeev Kumar.
Radiation Physics and Chemistry 135 (2017) 55–62.

29. **Measurement of large angle Rayleigh scattering cross sections for 39.5, 40.1 and 45.4 keV photons in elements with $26 \leq Z \leq 83$.**
Upmanyu A, Singh G, Duggal H.,Kainth H.S., Bhalla A, Kumar S.
Applied Radiation and Isotopes 128 (2017) 125–131.

30. **Rayleigh scattering of $_{66}$Dy-K X-rays in elements with $22 \leq Z \leq 90$.**
Gurjot Singh, Arun Upmanyu, Prem Singh, H.S. Kainth and Sanjeev Kumar.
Radiation Physics and Chemistry 141 (2017) 257–263.

31. **Alignment of L_3 subshell vacancy states created without Coster-Kronig decay through the selective photoionization in $_{82}Pb$, $_{90}Th$ and $_{92}U$ and effect of external magnetic field.**
Gurjeet Singh, Gurjot Singh, Arun Upmanyu, Harpreet S. Kainth, Sanjeev Kumar, Devinder Mehta.
Eur. Phys. J. D (2017) 71: 248 DOI: 10.1140/epjd/e2017-80346-8.

32. **Fabrication of thin targets of $_{160}Gd$ by thermal evaporation technique.**
Kavita S. R., Abhilash,D. Kabiraj,K. S. Golda,Sundeep Chopra, Sunil Ojha,G. R. Umapathy,D. Mehta, Gurjot Singh, Sanjeev Kumar,Rakesh Kumar, Hardev Singh.
Vacuum 145 (2017) 1113.

33. **Physio-chemical and EDXRF Analysis of Water Samples from District Kurukshetra.**
Prem Singh, Poonam Gramni, H. S. Kainth, A. Upmanyu and S. Kumar
Nature and Science 2017;15(2).

34. **Chemical state analysis of Cl Kα and $K\beta_{1,3}$ X-ray emission lines using polychromatic WDXRF spectrometer.**
Harpreet Singh Kainth, Arun Upmanyu, Hitesh Sharma, Tejbir Singh, Sanjeev Kumar.
Nuclear Inst, and Methods in Physics Research B 416 (2018) 62–67.

35. **Dosimetry of adult and pediatric patients for common digital radiography examinations,**
Bhupendra Singh Rana, Sanjeev Kumar Inderjeet Singh Sandhu Narinder Paul Singh
Radiation Protection Dosimetry (2018), pp. 1–9, doi:10.1093/rpd/ncx293.

36. **Investigations on Photocatalytic, Antimicrobial and Magnetic Properties of Sol–Gel-Synthesized Ga-Doped ZnO Nanoparticles.**
Jaskaran Singh Malhotra, Arnav Sharma, Arun Kumar Singh, Sanjeev Kumar, Bhupendra Singh Rana.
International Journal of Nanoscience Vol. 17, No. 3 (2018) 1850014.

37. **Estimation of radiation exposures to the patients in diagnostic and therapeutic interventional procedures.**
Bhupendra Singh Rana, Sanjeev Kumar, Chirag Kamal Ahuja Narinder Paul Singh Mukesh Kumar Yadav Inderjeet Singh Sandhu
Radiation Protection Dosimetry, (2018), https://doi.org/10.1093/rpd/ncy025

38. **Study of Chemical Shift in Kα, $K\alpha\beta_{1,3}$ and Kβ X-ray emission lines of**

$_{37}$Rb compounds with WDXRF.
Harpreet Singh Kainth, Ranjit Singh, Tejbir Singh, D. Mehta, J. S. Shahi, and Sanjeev Kumar
*AIP Conference Proceedings **1953**, 140028 (2018); doi: 10.1063/1.5033203.*

39. **Measurement of L XRF cross-section for elements with 33 ≤ Z ≤ 51 and their interpretation in terms of Li (I =1-3) subshell vacancy decay parameters.**
Veena Sharma, Heena Duggal, J.S. Shahi, D. Mehta, Harpreet Singh Kainth and Sanjeev Kumar
Nucl. Instrum. and Meth. B Volume 429, 15 August 2018, Pages 19-26

40. **Instrumental detection limit and sensitivity of K and L shell X-ray emission lines of 17Cl, 37Rb and 38Sr elements using PC-WDXRF spectrometer.**
Harpreet Singh Kainth, Tejbir Singh, Jangvir Singh Shahi, Devinder mehta and Sanjeev Kumar
X-ray spectrometry (2018), https://doi.org/10.1002/xrs.2950.

41. **Measurements of elastic scattering cross sections for 25.21 28.5,37.4,36.8 and 42.2 keY X-ray photons in elements with 22 < Z < 83.**
Arun Apmanyu, Gurjot Singh, Harpreel Singh Kainth, Deyinder Mehta, Jangvir Singh Shahi, Sanjeev Kumar
X-ray spectrometry (2018), https://doi.org/10.1002/xrs.2974.

42. **Patients dose estimation in CT examinations using size specific dose estimates.**
Neha Choudhary, Bhupendra Singh Rana, Arvind Shukla, Arun Singh, Oinam, Narinder Paul Singh and Sanjeev Kumar
Radiation Protection Dosimetry, Radiation Protection Dosimetry (2018), pp. 1–7 doi:10.1093/rpd/ncy207.

43. **Dosimetry study of Co-60 source step size in uterine cervix intracavitary HDR brachytherapy.**
Arvind Kumar Shukla Bhupendra Singh Rana Narinder Paul Singh Sanjeev Kumar
Brachy therapy 18 (2019) 180.

44. **Photocatalytic performances of stand-alone graphene oxide (GO) and reduced grahene oxide (rGO) nanostructures.**
I. S. Sandhu, M. Chitkara, S. Rana, G. Dhillon and S. Kumar
Optical and quantum electronics 52 (2020) 359.

45. **Thickness measurement of low-Z films fabricated on thick substrate using EDXRF technique.**
A. K. Upmanyu, A. Kapil, Kailash, D. Mehta and S. Kumar
Vaccum 183 (2020) 109852 https://doi.org/10.1016/j.vacuum.2020.109852.

46. **Systematic measurements of M X-ray Components X-ray fluorescence cross-sections for the elements with 77 ≤ Z ≤ 92 by employing laboratory source based energy dispersive X-ray fluorescence setup.**
Muhanad Alrakabi, Ashutosh Kapil, Kailash, Heena Duggal, Samarjit Sihotra, Devinder Mehta, Sanjeev Kumar
X-Ray Spectrom. DOI: 10.1002/xrs.3281, 2022;1–13.

47. **Influence of chemical effects on the Li (i = 1–3) subshell X-ray spectra for ^{79}Au compounds.**
Heena Duggal, Ashutosh Kapil, Kailash, D. Mehta, Sanjeev Kumar
Radiation Physics and Chemistry 193 (2022) 109885.

48. **Measurement of uranium in phosphate fertilizers for groundwater contamination employing X-ray and γ-ray spectroscopic techniques.**
Gurjeet Singh, Harpreet Singh Kainth, Gurjot Singh, Nisha Rani, Heena Duggal, Arun Upmanyu, Atul Bhalla, Sanjeev Kumar, Devinder Mehta
Journal of Radioanalytical and Nuclear Chemistry,

https://doi.org/10.1007/s10967-022-08269-2, 23 (2022).

49. **Fabrication of 75As targets for heavy ion nuclear reactions.**
S. Sihotra*, Ashutosh Kapil, Sanjeev Kumar, D. Mehta
Vacuum 201 (2022) 111110.

50. **Fabrication of silica films using Langmuir Blodgett technique for sensing applications.**
Rajwinder Singh, J. S. Shahi and Sanjeev Kumar
AIP Conference Proceedings **2357**, 050017 (2022); https://doi.org/10.1063/5.0080760.

51. **Rayleigh differential scattering cross-sections for Mn Kα and Mn Kβ photons in some rare earth elements.**
Arun Upmanyu, Harpreet Singh Kainth, Kailash, Ashutosh Kapil, Sanjeev Kumar and Devinder Mehta
AIP Conference Proceedings **2357**, 070005 (2022); https://doi.org/10.1063/5.0080605.

52. **Synthesis of MWCNTs/CuO nanocomposites using azadirachta indica leaf extract for using azadirachta indica leaf extract for antimicrobial application.**
Ankita Taneja, Sakshi Bansal, Sushil Kumar, Hardev Singh and Sanjeev Kymar
AIP Conference Proceedings **2357**, 050018 (2022); https://doi.org/10.1063/5.0082009.

53. **Fabrication of thin Molybdenum backed target using rolling method**
A. Pandey, R. Bhushan, A. Rohilla, S. Chakrabort, R.P. Singh, S. Ojha, D. Mehta, Kailash, S. Kumar, S.K. Chamoli,
Appl. Rad. Iso. 199 (2023) 110860.

54. **Photocatalytic and molecular docking supported antimicrobial investigations of PVP capped MWCNTs/La/ZnO nanostructures**
R. Singh, K. Kumar, J.S. Shahi, S. Kumar, A. Taneja., M. Chitkara, H. Garg, H. Singh, V. Kumar, S. Kumar.
Mater. Sci. Eng. B 295 (2023) 116582.

55. **Structural, optical, dielectric and magnetic behaviour of Cu1-xCoxO (x = 0.2-0.10) nano-composites and their applications in efficient removal of Cr (VI) ion from water**
Sushil Kumar, Ankita Taneja, Harish Garg, Rajwinder Singh, Rahul Goel, Stuti Aggarwal, Hardev Singh, Sanjeev Kumar
Material Today Communications 38 (2024) 108115.

56. **Fabrication of ^{197}Au-backed Silicon target for In-beam Gamma-ray spectroscopy experiment**
Subodh, Abhilash S.R., Madan Sharma, Sanjeev Kumar, R.P. Singhb and B.R. Behera
Journal of Instrumentation, Volume 19, April 2024. ***DOI*** *10.1088/1748-0221/19/04/P04012*

57. **Diverse capability of chemically exfoliated 2D MoS_2 nanosheets for photocatalytic, adsorption and antibacterial applications supported by in silico molecular docking.**
Rajwinder Singh, Sushil Kumar, Kanishk Poria, Ankita Taneja, Hardev Singh, Sanjeev Kumar, J. S. Shahi
Optical and Quantum Electronics Accepted Dec, 2024..

Book Chapters:

1. BooK**:** Nanomaterials in antimicrobial therapy, applications of nanobiomaterials Vol. 6, Chapter 14, Nanomaterials: Boon to mankind and bane to pathogens. Publisher: Elsevier ISBN NO: 978-0-323-42864-4.
2. BooK: CRC Concise Encyclopedia of Nanotechnology,
Chapter: Potential applications and implications of nanoparticles in Biology and medicine. Publisher: CRC press Taylor and Francis group, ISBN NO: 13: 978:1:4665:8089-3.

3. BooK: CRC Concise Encyclopedia of Nanotechnology, Chapter:Semiconductor Nanomaterials: Photocatalytic Characteristics of Wide Bandgap Semiconductor Nanomaterials, Page 975-983, 13;978-1-4665-8089-3.
4. Book Chapter: Published book chapter entitled "**Environment concept**" in "**Environmental Road Safety Education Violence Against Women and Children, Drug Abuse**", Mohindra Publishing House, Chandigarh, ISBN: 978-93- 82068-26-8, 2020.

Seminars/ Conferences/Symposiums (Paper Presented)

1. Measurements of scattering cross-section for the 14.93 keV photons at a angle of 133°.
   15th National symposium on Radiation Physics 2003, BARC, Mumbai, India.
2. Probabilities for radiative vacancy transfer from L_i subshell to M and N shells for some heavy elements.
   15th National symposium on Radiation Physics 2003, BARC, Mumbai, India.
3. M_ξ, $M_{\alpha\beta}$, M_γ and M_m X-ray fluorescence cross-sections for elements with $71 \leq Z \leq 90$.
   National Symposium on Radiation Measurements and Applications (NSRMA-2004) at Punjabi university, Patiala.
4. Probabilties for radiative vacancy transfer from L_i(i = 1,2,3) subshells to the M, N and higher shells for elements with $77 \leq Z \leq 92$.
   5th international conference of inelastic x-ray scattering, Argonne, Illionis, USA p. 71 (2004).
5. Rayleigh and resonant Raman scattering cross-sections in $_{83}$Bi for 88.03 keV γ-rays.
   20th International Conference X05: X-ray and Inner-Shell Processes, University of Melbourne.
6. M_ξ,$M_{\alpha\beta}$,M_γ and M_m X-ray fluorescence cross-sections for elements with $71 \leq Z \leq 90$.
   20th International Conference X05: X-ray and Inner-Shell Processes, University of Melbourne.
7. An EDXRF study of the photodecomposition of diorganyl ditellurides.
   20th International Conference X05: X-ray and Inner-Shell Processes, University of Melbourne.
8. Measurement of K-L, K-M and (K-N) resonant Raman scattering cross-sections in $_{83}$Bi for 88.03 keV γ-rays.
   16th National symposium on Radiation Physics 2006, IGCAR, Kalpakkam.
9. Large angle elastic and inelastic scattering of 14.93 keV photons.
   16th National symposium on Radiation Physics 2006, IGCAR, Kalpakkam.
10. Photon-atom scattering of 59.54 keV γ-rays in elements with Z = 12-92.
    Symposium on radiation sources, detection and applications (SRSDA-2007) at Punjabi university Patiala.
11. L x-ray fluorescence cross-sections for elements with $32 \leq Z \leq 55$ at 5.959 keV.
    Symposium on radiation sources, detection and applications (SRSDA-2007) at Punjabi university Patiala.
12. Angular dependence of L_3 subshell x-ray emission in case of $_{56}$Ba and $_{57}$La elements.
    2nd Chandigarh science congress at Panjab University Chandigarh, 14-15 March 2008.
13. Elemental analysis of nano-material using EDXRF technique.
    3rd Chandigarh science congress at Panjab University Chandigarh, 26-

27 Feb. 2009.

14. Characterization of Low energy Ge detector.
3rd Chandigarh science congress at Panjab University Chandigarh, 26-27 Feb. 2009.

15. Contribution of near edge processes to attenuation of x-rays.
3rd Chandigarh science congress at Panjab University Chandigarh, 26-27 Feb. 2009.

16. Uranium contamination of ground water in Punjab region.
International conference and exhibition on Recent Advances in Environmental
Protection, organized by Department of Chemistry St. John's College, Agra, India, December 17-19, 2009.

17. Measurement of resonant Raman scattering contribution to characteristic X-ray attenuation in the various chemical forms of attenuator element.
Panjab Science Congress, Panjab University, Chandigrah, March 2010.

18. Effect of external magnetic field on the L x-ray emission in case of $_{79}$Au, $_{83}$Bi, $_{90}$Th, and $_{92}$U following photoionization.
Panjab Science Congress, Panjab University, Chandigrah, March 2010.

19. Effect of Coster-Kronig transition on the L_3-subshell vacancy alignment in $_{58}$Ce, $_{59}$Pr and $_{60}$Nd following photoionization.
Panjab Science Congress, Panjab University, Chandigrah, March 2010.

20. Study of chemical effect on L_i subshell X-ray emission for $_{80}$Hg, $_{82}$Pb and $_{83}$Bi elements.
4rd Chandigarh science congress at Panjab University Chandigarh, 19-20 March. 2010.

21. Investigation relevant to Uranium contamination of ground water in Malwa region of Punjab State.
International conference on Environmental Challenges: A Global Concern, organized by Kanya Maha Vidayalaya, Jalandhar, 15-16 Oct. 2010.

22. Flyash from thermal power plants as possible source of uranium contamination of ground water.
International conference on Environmental Challenges: A Global Concern, organized by Kanya Maha Vidayalaya, Jalandhar, 15-16 Oct. 2010.

23. Characterization of some nano-material samples using non-distructive energy dispersive x-ray fluorescence (EDXRF) technique
National Conference on Material Science & Technology : Emerging Trends on 23-October, Organized by D.A.V. College, Jaladhar city. 2010.

24. Elemental and compositional analysis of the transition and rare earth metal doped ZnS nano-material using EDXRF Technique.
National symposium on radiation Physics and nano-technology (NSRPN-2011) on 4-5 Feb, 2011, Department of Physics, Punjabi University Patiala.

25. Thickness measurement of Carbon nanotubes (CNT) films deposits on Si/Glass substrate using EDXRF technique. **(Best Poster Presentation)**
National symposium on radiation Physics and nano-technology (NSRPN-2011) on 4-5 Feb, 2011, Department of Physics, Punjabi University Patiala.

26. Study of alignment of L_3 subshell vacancy states in $_{79}$Au, $_{83}$Bi, $_{90}$Th, and $_{92}$U following photoionisation by 59.54 keV γ-rays and the effect of magnetic field.
National symposium on radiation Physics and nano-technology (NSRPN-2011) on 4-5 Feb, 2011, Department of Physics, Punjabi University Patiala.

27. Trace elemental analysis using a versatile and easy to handle EDXRF setup.
National symposium on radiation Physics and nano-technology (NSRPN-2011) on 4-5 Feb, 2011, Department of Physics, Punjabi University Patiala.

28. EDXRF monitoring of toxic elements in ground water of Malwa region in Punjab.
National symposium on radiation Physics and nano-technology (NSRPN-2011) on 4-5 Feb, 2011, Department of Physics, Punjabi University Patiala.

29. Photoluminescence and photo-catalytic activity of synthesized nanocrystals.
Villa Conference on Interactions Among Nanostructures (VCIAN-2011) on 21-25 April, 2011, Las Vegas, Nevada, USA.

30. Synthesis and characterization of Ag nanoparticles for Pharmaceutical and Biomedical Applications.
National Conference on Nanoscience Fundamentals and Applications (NCNFA-2011) on 23-24 July, 2011, Chitkara University, Punjab Campus.

31. Usage of nanoparticles in water treatment and purification.
National Conference on Nanoscience Fundamentals and Applications (NCNFA-2011) on 23-24 July, 2011, Chitkara University, Punjab Campus.

32. Synthesis and photocatalytic activity of Sm^{3+} doped ZnO nanocrystals by chemical co-precipitation method.
National workshop cum seminar on advances in electron microscopy and allied fields on 23-29 September, 2011, Shoolini University, Solan (H.P.).

33. Elemental analysis of ground water from different region of Punjab State (India) using EDXRF technique and the source of water contamination.
4th International Conference on Environmental & Computer Science (ICECS-2011) on 16-18 Sept, 2011, Singapur.

34. Elemental analysis of Marshes, rivers and ground water in Thi Qar region, Iraq.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

35. Measurement of $KL_{2,3}$ radiative resonant Raman scattering in $_{24}Cr$ for unpolarized Mn Kα X-rays.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

36. A calibration method for patient specific IMRT QA using a single therapy verification film.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

37. Measurement of M x-ray production cross-sections for elements with $77 \leq Z \leq 92$ at 5.96 keV incident photon energy.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

38. Synthesis, Characterization and photocatalytic activity of Sm^{3+} doped ZnS

nanomaterials.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

39. Sources of Uranium contamination in ground waters of Malwa region, Punjab.
2nd National Conference on advanced materials and radiation Physics (AMRP-2011), organized by Department of Physics, Sant Longowal Institute of Engineering and Technology, Longowal, Sangrur on Nov. 4-5, 2011.

40. Dosimetric plan analysis of gamma knife stereostatic radio surgery (SSR)
32nd Annual conference of the association of Medical Physicist of India (AMPICON 2011), organized by the Department of Radiation Oncology at Christian Medical College, Vellore on 17-18 Nov, 2011.

41. Alternative methods of feathering technique for field junction of cranio spinal irradiation in medulloblastoma treatment.
33nd National annual conference of association of Radiation oncologists of India (AROICON 2011), organized by B.M. Birla Science and Technology centre, Statue Circuit, Jiapur on 24-27 Nov, 2011.

42. Synthesis and thermoluminescence properties of Eu^{3+} doped ZnS nanomaterials.
International conference on Advances in Materials and Materials Processing 2011 (ICAMMP 2011), organized by Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Kharagpur, on 9-11 December, 2011.

43. Photocatalytic activity of Chromium ion doped ZnO nanostructure.
International conference on "Frontiers in Nanoscience, Nanotechnology and their applications: NanoSciTech-2012" organized by Department of Chemical Engineering, Panjab University, Cahndigarh on 15-18 Febuary, 2012.

44. Optical properties of rare earth metal doped ZnS nanocrystals.
National conference on "Recent advances in material science" organized by Dyal Singh College, Karnal on 25-26 Febuary, 2012.

45. In vivo distribution of stem cells labeled with biocompatible nanoparticles in brain.
National conference on "Recent advances in material science" organized by Dyal Singh College, Karnal on 25-26 Febuary, 2012.

46. Material Science conference (Shakunpreet)
Chitkara University, Punjab Augest, 2012.

47. Investigation of Uranium contamination in ground water of southwest Punjab using EDXRF technique.
NRC-8, EuCheMS, International conference on nuclear and radiochemistry, 16-21 September, 2012, Como, Italy.

48. Determination of escape peak probability and efficiency of low energy germanium (LeGe) detector.
International conference on recent trend in nuclear Physics held at Chitkara University, Barotiwala, Solan (H.P.) from November 19-21, 2012

49. Photocatalytic degradation of Methylene Blue Dye with Transition Metal Doped ZnO Nanocrystals under Sunlight Exposure.
International Conference on Emerging trends in Physics for Environmental Monitoring and Management (ETPEMM-12) December 17-19, 2012.

50. Degradation of Methylene Blue Dye by La-Carbon nanotubes/ZnO nano-composites under UV/sunlight exposure.
International Conference on Emerging trends in Physics for Environmental

Monitoring and Management (ETPEMM-12) December 17-19, 2012.

51. Magnetic properties of Cr(III) and Fe(III) doped ZnO Nanoparticles prepared by chemical route.
7th Chandigarh Science Congress, "Contemporary issues & interdisciplinary Science & technology for Societal needs, March 1-3, 2013 at Panjab University, Chandigarh.

52. Studies on the synergetic activity of pure and doped ZnS and ZnO nanoparticles (NPS).
Advances in Pharmacological & Pharmaceutical Approaches to Drug Discovery & Clinical Development (APPADDCD-2013)" on 15-16 March, 2013 at Chitkara College of Pharmacy, Chitkara University, Punjab.

53. Measurements of scattering cross-section for 5.895 keV photons from various elements/compounds in liquid phase.
8th Chandigarh science congress at Panjab University Chandigarh, 26th-28th Feb. 2014.

54. Contribution of Di-ammonium phosphate fertilizer to ground water contamination.
8th Chandigarh science congress at Panjab University Chandigarh, 26th-28th Feb. 2014.

55. Measurements of elastic and inelastic scattering cross-section for 5.895 keV photons from various polymers.
8th Chandigarh science congress at Panjab University Chandigarh, 26th-28th Feb. 2014.

56. Study of Confirmity and hogeinity indices for various brain tumers treated with stereotatic radiosurgery using Gamma Knife.
36th National Conference of Association of Radiation Oncologist of India "AROICON 2014" held in Imphal from 6th Nov-9th Nov 2014.

57. Measurement of patient skin doses in X-ray based radiological interventional procedures.
36th National Conference of Association of Radiation Oncologist of India "AROICON 2014" held in Imphal from 6th Nov-9th Nov 2014.

58. Study of source step size in Co^{60} HDR brachytherapy.
35th National annual conference of Association of Medical Physicists of India "AMPICON 2014" held Loni Maharatra from 20th Nov-22th Nov 2014.

59. Measurements of Scattering Cross Sections for 5.895 keV Photons in Various Polymers.
ICTFE 2014 : 16th International Conference on Thermal and Fluids Engineering London, United Kingdom, November 28 - 29, 2014.

60. Differential cross-section measurements for elstic scattering of 5.895 keV photon by various elements/compounds in liquid phase.
9th Chandigarh science congress at Panjab University Chandigarh, 25th-27th Feb. 2015.

61. Antimicrobial and photocatalytic activities of Mn/Fe doped ZnO nanoparticles.
UGC funded one day national seminar on recent developments in theoretical and experimental Physics (RDTEP-15), at S.D. College (LAHORE) Ambala Cantt 21th March 2015.

62. Dose estimation in water equivalent phantom using geant4 simulation toolkit.
17th Asia Oceania Congress of Medical Physics (AOCMP) and 38th Annual Conference of Association of Medical Physicists of India (AMPICON), 4th-7th November, 2017, Jaipur, Rajasthan, India.

63. Estimation of radiation doses in diagnostic and interventional theraputic radiological procedures.
17th Asia Oceania Congress of Medical Physics (AOCMP) and 38th Annual Conference of Association of Medical Physicists of India (AMPICON), 4th-7th November, 2017, Jaipur, Rajasthan, India.

64. Measurement of entrance skin doses in common digital radiography examinations & proposed local diagnostic reference levels.
17th Asia Oceania Congress of Medical Physics (AOCMP) and 38th Annual Conference of Association of Medical Physicists of India (AMPICON), 4th-7th November, 2017, Jaipur, Rajasthan, India.

65. Measurement of entrance skin doses in common digital radiography examinations & proposed local diagnostic reference levels.
17th Asia Oceania Congress of Medical Physics (AOCMP) and 38th Annual Conference of Association of Medical Physicists of India (AMPICON), 4th-7th November, 2017, Jaipur, Rajasthan, India (Utkarsh and Rahul).

66. Fabrication of silica films using Langmuir Blodgett technique for sensing applications.
National Conference in Applied Sciences and Mathematics (NCASM-2020) at Chitkara University Punjab on 24-25 Sep., 2020.

67. Rayleigh differential scattering cross-sections for Mn Kα and Mn Kβ photons in some rare earth elements.
National Conference in Applied Sciences and Mathematics (NCASM-2020) at Chitkara University Punjab on 24-25 Sep., 2020.

68. Synthesis of MWCNTs/CuO nanocomposites using azadirachta indica leaf extract for using azadirachta indica leaf extract for antimicrobial application.
National Conference in Applied Sciences and Mathematics (NCASM-2020) at Chitkara University Punjab on 24-25 Sep., 2020.

69. Elemental analysis of Ayurvedic Medicines using Wavelength Dispersive X-ray Fluorescence Techniques
International Conference in Multidisciplinary Sciences and Engineering Research (ICAMSER-2021)" on July 2-3, 2021 at Chitkara University, Himachal Pradesh.

70. The antibacterial behavior of salt assisted chemically exfoliated MoS_2 nanosheets against pathogenic strains.
65th DAE-Solid State. Physics Symposium. December 15-19, 2021, DAE Convention Centre,. Anushaktinagar, Mumbai.

71. Elemental Analysis of Ayurvedic Medicines Using X-Ray Tube Based Portable Energy Dispersive XRF Setup.
2nd International Conference on Industrial & Manufacturing Systems (CIMS-2021) is to be organized as a joint venture of PEC, Chandigarh, and NIT, Jalandhar, during 11 - 13 November 2021.

72. Room temperature ferromagnetism in $Cu_{1-x}Co_xO$ nanocomposites.
ICSSR Sponsored National Seminar on Recent Trends in Information technology" organized by PG Department of Information Technology, GGDSD College, Chandigarh on 25 March, 2022.

73. Thermoluminescence behaviour of $Zn_{1-x}Y_xO$ (x =2-10) nanophosphors prepared by co-precipitation method.
International Conference On Emerging Trends in Science and Technology, Organized by Department of Applied Sciences, PEC, Chandigarh on 10-11 June, 2022.

74. Elemental analysis of British decimal coins using energy of dispersive X-ray fluorescence technique.
International Conference On Emerging Trends in Science and

Technology, Organized by Department of Applied Sciences, PEC, Chandigarh on 10-11 June, 2022.

75. Synthesis Elemental analysis of gold jewellery using non-destructive portable EDXRF spectrometer.
International Conference On Emerging Trends in Science and Technology, Organized by Department of Applied Sciences, PEC, Chandigarh on 10-11 June, 2022.

76. Measurements of Si escape peaks intensities in portable X-ray fluorescence spectra.
International Conference On Emerging Trends in Science and Technology, Organized by Department of Applied Sciences, PEC, Chandigarh on 10-11 June, 2022.

77. Luminescence behavior of $MoS_2/Zn_{1-x}Y_xO$ (x = 2-10) nanocomposite synthesized by hydrothermal method.
International Conference On Emerging Trends in Science and Technology, Organized by Department of Applied Sciences, PEC, Chandigarh on 10-11 June, 2022.

Refresher Courses/Workshops/ Training Programmes

Nature of the Course	Place	Duration	Sponsoring Agency
1. Short term course	Department of Applied Sciences, NITTTER, Chandigarh	07/05/2012 to 11/05/2012	AICT
2. 1st DST Inspire Internship Camp	Panjab University, Chandigarh	23/03/2015 to 27/03/2015	DST, New Dehli
Orientation Course	UGC-Human resource development centre, Panjab University, Chandigarh.	22/04/2015 to 19/05/2015	UGC, New Delhi
3. Refresher Course	Department of biochemistry, Panjab University, Chandigarh	25/05/2016 to 15/06/2016	UGC, New Delhi
4. Short term course on "Characterization of Advanced Functional Materials"	Applied Sciences Department, Punjab Engineering College (Deemed to be University)	18/06/2018 to 24/06/2018	TEQIP-III project
5. Two day DAE-BRNS workshop	Centre for Medical Physics and Department of Physics, Panjab University, Chandigarh	29/11/2018 to 30/11/2018	IANCAS, BARC, Mumbai
6. National Hands–on Workshop on "Characterization Techniques and Nanomaterial Application"	Department of Applied Sciences, Chitkara University Patiala, Punjab	20/01/2020 to 25/01/2020	-
7. One-week faculty-cum-student skill development programme on "Biological Data Analysis & Data Science" organized under Rashtriya Uchchatar Shikhsa Abhiyan (RUSA)	Department of Bioinformatics and Biochemistry, GGDSD College, Chandigarh	27/02/2020 to 04/03/2020	Rashtriya Uchchatar Shikhsa Abhiyan (RUSA) DHE Chandigarh Administration
8. Short term course on "Material Characterization Techniques	Institute Instrumentation Center, Dr B R Ambedkar National Institute of Technology,	24/08/2020 to 28/10/2020	TEQIP-III project

	Jalandhar.		
9. One week (online) Short Term Course on Advanced Energy Materials organized	Department of Physics, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, Punjab (India).	12/10/2020 to 16/10/2020	-
10. Refresher Course	Department of Applied Sciences, NITTTER, Chandigarh	19/06/2020 to 02/07/2020	AICT
11. Refresher Course on environment studies	UGC-Human resource development centre, Panjab University, Chandigarh	24/12/2020 to 06/01/2021	UGC, New Delhi
12. Online short term course on Course on Novel Functional Materials	Department of Physics, Dr. B. R. Ambedkar National Institute of Technology, Jalandhar, Punjab (India).	11/01/2021 to 16/01/2021	TEQIP-III
13. Orientation & Sensitization Programme	UGC-Malaviya Mission Teacher Training Centre (MMTTC), Panjab University, Chandigarh.	01.02.2024 to 14.02.2024	UGC, New Delhi

Invited Talks

- Attended and delivered a talk on, "X-ray spectrometry, present and future" at one day seminar programme on recent advances in accelerator and detector technology for nuclear physics, 20th March, 2015 at Department of Physics, Panjab University, Chandigarh.

- Delivered an invited talk on, **"X-ray spectrometry in advance functional material characterization"** in **Short Term Course** on "Characterization of Advanced Functional Materials" (CAFM-2018) from 18 June to 24 June 2018, Punjab Engineering College (Deemed to be University).

- Worked as Resource Person in National Hands–on Workshop on **"Characterization Techniques and Nanomaterial Application**" held from January 20th –January 25th 2020 at Department of Applied Sciences, Chitkara University Patiala, Punjab.

- Delivered an invited talk in National Hands–on Workshop on **"Material characterization in X-ray spectrometry**" held from January 20th – January 25th 2020 at Department of Applied Sciences, Chitkara University Patiala, Punjab.

- Delivered an invited talk in National Hands–on Workshop on **"X-ray diffraction technique in material characterization**" held from January 20th –January 25th 2020 at Department of Applied Sciences, Chitkara University Patiala, Punjab.

- Delivered an invited talk in National Hands–on Workshop on **"Introduction to Corel draw software**" held from January 20th – January 25th 2020 at Department of Applied Sciences, Chitkara University Patiala, Punjab.

- Attended and delivered an invited talk on,"**Basics and applications of X-ray spectrometry**" in National Conference in Applied Sciences and Mathematics (NCASM-2020) at Chitkara University Punjab on 25th Sep., 2020.

Projects

Title of the project	Funding Agency	Amount sanctioned	Time period
1. Investigation of uranium mobilization from subsurface sediments by effect of bicarbonates and other ions in groundwater of Malwa Region of Punjab state in India.	DAE Consortium for Scientific Research, Kolkata Centre	16 lacs	Three year (01/01/2013 to 31/12/2017)
2. "DBT-BUILDER-G.G.D.S.D. College Interdisciplinary Life Science programme for Advance Research and Education"	Ministry of science and technology, Department of Biotechnology	1.96 Crore	Five Year (22/03/2021 to 21/03/2026)
3. Study of photon-atom interaction and inner-shell vacancy decay processes in the	SERB (Department of Science & Technology, India) funded research project (Project No. **CRG/2023/006835**)	33 Lac	Three Year (30/01/2024 to 29/01/2027)

	vicinity of ionization threshold energies
MOOCS/Online Content	• Developed online contents for UG and PG classes available on college website.
M. Phil Dissertation Supervised	Nil
PhD Thesis	Degree awarded: 07 Submitted: 01 Doing: 05
Administrative Experience	• Chief Warden, Boys Hostel, G.G.D.S.D. College, Sector 32C, Chandigarh since October 2021 till date. • Member, Postgraduate Board of Studies in Physics, Department of Physics, Panjab University, Chandigarh. • Member, Board of Studies in Applied Sciences, UIET, Panjab University, Chandigarh. • Co-ordinator of the DBT-BUILDER-G.G.D.S.D. College Interdisciplinary Life Science programme for Advance Research and Education • Successfully conducted University Exams (Centre-32,33) in 2014,2015 (as Deputy Superintendent) and 2018 (As Superintendent)
Membership of Economic Associations	• Life-time member of Indian Society of Radiation Physics. • Life-time member of Indian Association of Physics Teachers (IAPT)