

CURRICULUM VITAE

Name: Dr. Sunil Kumar
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Assistant Professor in Physics
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Academic Qualifications:

- **2006-2011: Ph.D. (Experimental Atomic and Nuclear Physics)** from Centre of Advance Study in Physics, Panjab University, Chandigarh, India.
Title of Thesis: Study of X-ray emission following inner-shell ionisation and analytical applications using EDXRF and PIXE techniques.
- **2002-2004: M.Sc. (Physics)** H.N.B. Garhwal University, Srinagar, India.
- **2001-2002: B. Ed.,** University of Jammu, India.
- **1998-2001: B.Sc.,** Govt. Degree College, Sarkaghat, HPU Shimla, India.

Other Qualifications: Qualified CSIR-UGC-NET examination for Lectureship.

Membership:

1. Life time member of Indian Science Congress.
2. Life time member of Indian Society for Technical Education (ISTE).
3. Life time member of India Society of Atomic & Molecular Physics (ISAMP).
4. Member of American Physics Society.
5. Editorial board member of the Physics journal “Journal of Nuclear Physics, Material sciences, Radiation and Application”.
6. Member of organizing committee of international conferences:
 - i. “Recent trends in Nuclear Physics – 2012 (ICRTNP-12)” organized from November 19-21, 2012.

ii. Member of organizing committee of International Conference on Mathematics & Engineering Sciences - 2014 (**ICMES-14**)” organized at Chitkara University, HP, India from March 20-22, 2014.

National Fellowships:

- i. SRF of UGC sponsored scheme for meritorious students based on the performance in the field of research (Feb.2011- July 2011).
- ii. JRF in UGC sponsored scheme for meritorious students, Department of Physics, Panjab University Chandigarh (2009-2011).
- iii. Project Fellow in IUAC funded project in Department of Physics, Panjab University Chandigarh (2008-2009).
- iv. Project Fellow in DST funded project in Department of Physics, Panjab University Chandigarh (2006-2007).

Research Project Completed:

1. Successfully completed the Research Project entitled “Study the effects of multiple ionization and nuclear spin in X-ray production cross-sections of high-Z elements by heavy ions” **Cost : INR: 14,99,000/-** Sanctioned under **Young Scientist Scheme** by SERB-DST, GOI, New Delhi from April 2015 to March 2018.

Books Published:

1. Has contributed in the Book “**The Engineering Physics and Material Sciences**” Ist edition (2013) published by Chitkara university publication. **ISBN : 978-93-82782-08-7.**
2. Has contributed in the Book “**The Engineering Physics**” Ist edition (2013) published by Chitkara university publication. **ISBN : 978-93-82782-04-9.**
3. Has contributed in the Book “**The Engineering Physics and material Sciences**” 2nd edition (2014) published by Chitkara university publication. **ISBN : 978-93-82782-08-7.**

Orientation Programme Attended:

- i. Induction Training for newly appointed assistant professor from 22-07-2019 to 03-08-2019, held at Govt. College for Teacher Education (GCTE) Dharmsala, Kangra, HP.
- ii. Orientation Program for teachers from 18-23 July, 2011 held at Chitkara University, Punjab.
- iii. Successfully completed Ph.D. course modules in Accelerators and Detectors at IUAC New Delhi (March 2007).

Computer Codes and other skills:

Operating Systems: XP, Window vista, Windows-7, Linux (Red Hat and Fedora). Strong experience of data handling and analysis using various softwares: Corel Draw, Origin, Gene2K, PEAKFIT, CANDLER, GUPIX.

Teaching Experience:

- i. Teacher Assistant (Two and half years) in the Department of Physics, Panjab University, Chandigarh (Feb., 2009-July, 2011).
- ii. Assistant Professor (18th July, 2011 – 30th Sept., 2015) Department of Applied Sciences, Chitkara University, Himachal Pradesh.
- iii. Associate Professor (1st October, 2015 – 25 May, 2018) Department of Applied Sciences, Chitkara University, Himachal Pradesh.
- iv. Assistant Professor (21st June, 2018 – Present) Department of Physics, Govt. Degree College, Banjar, Kullu, Himachal Pradesh.

Research Experience:

More than Fourteen years research experience in the study of photon-atom and ion-atom interaction processes using photon sources and ion beams from particle accelerators. The photon-atom interactions are studied at the EDXRF Laboratory, Department of Physics, Panjab University, Chandigarh and ion-atom interaction processes are studied using 15 UD pelletron accelerator at Inter University Accelerator Centre (IUAC), New Delhi, 3 UD pelletron at Institute of Physics (IOP) Bhubaneswar, Orissa and Variable energy

Cyclotron, Chandigarh. Good practice in the operation and handling radiation detectors (Scintillators, Si(Li) and HPGe detectors) and setting of associated electronics for the study of photon-atom and ion-atom interaction processes. Actively involved in assembling, testing of atomic physics beam line at IUAC, for the study of the ion induced inner shell ionization processes in solid and gas targets. Participated in different experiments at GPSC beam line of IUAC pelletron, New Delhi, PIXE experiments at IOP Bhubaneswar, Orissa NCCCM, ECIL, Hyderabad, and Variable Energy Cyclotron, Chandigarh. Excellent in the fabrication of nano-size solid target films using vacuum evaporation techniques and also self supporting foils using mechanical rolling. Good experience in preparation of environmental, biological, geological and chemical targets using pellet making machines and Personal Aerosol Monitor (PAM).

Workshops/Conferences/Seminars attended:

- i. Participated in the AUC (Accelerator User committee) held on 17-18 Dec, 2007 at IUAC New Delhi and also got the beam time of 16 shifts.
- ii. Poster presented in Chandigarh Science Congress in 2008 in the Department of Physics, Panjab University, Chandigarh.
- iii. Poster presented in Chandigarh Science Congress in 2009 in the Department of Physics, Panjab University, Chandigarh.
- iv. Poster presented in Chandigarh Science Congress in 2010 in the Department of Physics, Panjab University, Chandigarh.
- v. Three day “National Theme Workshop on Nuclear Reaction Mechanism” held at Chandigarh (17-19 March, 2010).
- vi. Poster presented in Chandigarh Science Congress in 2011 in the Department of Physics, Panjab University, Chandigarh.
- vii. The 4th DAE-BRNS Theme Meeting on EXFOR Compilation of Nuclear Data” held on 4–8 April, 2011, Department of Physics, Panjab University, Chandigarh, India.
- viii. “National Symposium on Nanotechnology” held at Chitkara University, Punjab on 23-24 July, 2011.

- ix. Workshop on Mathematica held at Chitkara University, Himachal Pradesh on 28-30 July, 2011.
- x. Advanced Material and Radiation Physics symposium-2011 (AMRP-11) held at SLIET Longowal on 4-5 Nov., 2011.
- xi. Workshop on Innovation Skills on 9-10th July 2012, held at Chitkara University, Rajpura, Punjab.
- xii. Workshop on Accelerator based atomic physics, held at Inter University Accelerator Centre (IUAC), New Delhi, on 8-9 August, 2012.
- xiii. Participated in international conference: "Recent trends in Nuclear Physics – 2012 (ICRTNP-12)" organized at Chitkara University, HP, India from 19-21, 2012.
- xiv. Attended International Conference on Mathematics & Engineering Sciences - 2014 (ICMES-14)" organized at Chitkara University, HP, India from March 20-22, 2014.
- xv. Participated in the AUC (Accelerator User committee-58) held on June 5-8, 2015 at IUAC, New Delhi and also got the beam time of 15 shifts.
- xvi. NATIONAL WORKSHOP on LaTeX: A Professional Tool for Thesis & Scientific Paper Writing organized at Chitkara University, HP, India from 30th June to 01st July, 2017.
- xvii. Workshop on 'Blended Learning Models & Assessment Strategies for Freshmen year of Engineering" organized at Chitkara University, Punjab, India from July 10 -13, 2017.
- xviii. 7th Topical Conference of the Indian Society of Atomic and Molecular Physics (ISAMP), at the Indian Institute of Science Education and Research (IISER) Tirupati, and Indian Institute of Technology (IIT) Tirupati, Andhra Pradesh, India, from 6 to 8 January 2018.

List of Publications:

- i. Resonant Raman scattering contribution to attenuation of x rays at energies in lower vicinity of the K-shell ionization threshold of some elements with $22 \leq Z \leq 71$, S. Kumar, V. Sharma, **Sunil Kumar**, M. Alrakabi, D. Mehta and N. Singh, *Journal of Applied Physics* **105** (2009) 104909.
- ii. Contribution of near-edge processes to attenuation of the characteristic x rays in elements with $48 \leq Z \leq 83$, **Sunil Kumar**, M. Alarkabi, S. Kumar, D. Mehta, S.C. Bedi, and Nirmal Singh, *Nucl. Instr. and Meth.* **B 268** (2010) 231.
- iii. Influence of resonant Raman scattering in the elemental analysis using X-ray emission based techniques, **Sunil Kumar**, G. Singh, S. Kumar, D. Mehta, and Nirmal Singh, *Nucl. Instr. and Meth.* **B 268** (2010) 2437-2445.
- iv. Influence of near-edge processes in the elemental analysis using X-ray emission based techniques, Gurjeet Singh, **Sunil Kumar**, N. Singh, J. Goswamy, and D. Mehta, *Pramana, Indian journal of Physics*, **76, No. 2** July (2011)1-18.
- v. PIXE analysis of blood samples of orthodontic patients to detect Ni poisoning, P. Balouria, M. Oswal, **Sunil Kumar**, I.M. Govil, B.P. Mohanty, S.P. Singh, M.L. Garg, *IJPIXE vol.* **21** (2011) 95-100.
- vi. Investigations relevant to uranium contamination of ground water in Punjab, M. Alrakabi, G. Singh, A. Bhalla, **Sunil Kumar**, S. Kumar, A. Srivastava, B. Rai, N. Singh, J.S. Shahi, D. Mehta, *Journal of Radioanalytical and Nuclear Chemistry* **291 No. 2** (2012).
- vii. Radiative resonant energy transfer: a new excitation process of beam-foil interaction, T. Nandi, M. Oswal, **Sunil Kumar**, A. Jhingan, S.R. Abhilash, and S. Karmakar, *J. Q. Spec. Rad.* **113** (2012) 783-788.
- viii. Study of aerosol samples using PIXE and EDXRF techniques, M. Oswal, R. Kaur, **Sunil Kumar**, B.P Mohanty, S. Kumar, D. Mehta, K.P Singh, *IJPIXE*, vol 2 (2012) 271.
- ix. Reply to query related to “Investigations relevant to uranium contamination of ground water in Punjab” G. Singh, M. Alrakabi, A. Bhalla, **Sunil Kumar**, S. Kumar, A. Srivastava, B. Rai, N. Singh, J.S. Shahi, D. Mehta, *Journal of Radioanalytical and Nuclear Chemistry* (2013) 1-3, March 08, 2013.
- x. Elemental analysis of soil samples using thick target-particle induced X-ray emission (TT-PIXE) technique, **Sunil Kumar**, D. Mehta, *Journal of Nuclear Physics, Material Science, Radiation and Application*, vol. 1 No. 2 (2014) 225.
- xi. Quality of water in and around Chandigarh-A review, Sandeep Singh, Nirankar Singh, **Sunil Kumar**, *Chitkara Chemistry Review* vol. 2 No. 1 (2014) 1-11.

- xii. Measurement of multi-nucleon transfer cross-section in ^{58}Ni , ^{56}Fe (C, X), X = ^{13}C , ^{11}B , ^{10}B , ^{10}Be , ^8Be and ^7Li at energy (12C = 60 MeV), B.J. Roy, A. Parmar, T. Nandi, B.P. Mohanty, M. Oswal, **Sunil Kumar**, A. Jhingan, V. Jha, D.C. Viswas, *PRAMANA, Journal of Physics*, Vol. 86, No. 1 (2016) 97-108.
- xiii. EDXRF analysis of some fungal species for the uptake capacity of ^{28}Ni , ^{48}Cd , and ^{82}Pb metal ions from aqueous solution, **Sunil Kumar**, Raman Kumar, D. Mehta, *Journal of Nuclear Physics, Material Science, Radiation and Application*, vol. 3 No. 2 (2016) 251 - 263.
- xiv. Measurements of *L* x-ray production cross sections in elements with $78 \leq Z \leq 92$ for 4-6 MeV/amu ^{19}F ions, **Sunil Kumar**, Mumtaz Oswal, G. Singh, G. Lapicki, T. Nandi, N. Singh, D. Mehta, *Nucl. Instr. and Meth. B* 395 (2017) 39–51.
- xv. Measurements of *L* x-ray production cross sections in elements with $78 \leq Z \leq 92$ for 4-6 MeV/amu ^{28}Si ions, Mumtaz Oswal, **Sunil Kumar**, Udai Singh G. Singh, K.P. Singh, D. Mehta, D. Mitnik, C. C. Montanari, and T. Nandi, *Nucl. Instr. and Meth. B* 416 (2018) 110-118.
- xvi. Contribution of flyash from coal-fired thermal power plants to uranium contamination of ground water, Gurjeet Singh, Gurjot Singh, Nisha Rani, Atul Bhalla, Arun Upmanyu, **Sunil Kumar** & Devinder Mehta, *Journal of Radioanalytical and Nuclear Chemistry*, vol. 318, Issue 2 (2018) 857-863.
- xvii. Experimental and theoretical L shell ionization cross sections of relativistic heavy atoms using the shellwise local plasma approximation, Mumtaz Oswal, **Sunil Kumar**, Udai Singh G. Singh, K.P. Singh, D. Mehta, D. Mitnik, C. C. Montanari, and T. Nandi, submitted to *Radiation & Physical Chemistry*, **176** (2020)108809.

Paper presented in International conference:

- i. Environmental applications of XRF and PIXE techniques, Mumtaz Oswal, **Sunil Kumar**, Veena Sharma, Rajbir Kau, A. Srivastava, , B. R.Behera, A. Kumar, D. Mehta, M. L. Garg and K.P Singh, Presented in IBA 2009.held at Cambridge university, UK.
- ii. Determination of escape peak probability and efficiency of low energy germanium (LEGe) detector, G. Singh, S. Kumar, S. Kumar and D. Mehta, Presented in *International Conference on Recent trends in Nuclear Physics-2012 (ICRTNP-12)*, held on 19-21 Nov., 2012 at Chitkara University, Solan, Himachal Pradesh.

Papers in National Conferences:

- i. Angular dependence of L_3 subshell x-ray emission in case of ^{56}Ba and ^{57}La elements, V. Sharma, S. Kumar, A. Kumar, **Sunil Kumar**, D. Mehta, and N. Singh *presented in second Chandigarh Science Congress at Panjab University, Chandigarh 2008.*
- ii. Contribution of near edge processes to attenuation of X-rays, **Sunil Kumar**, S. Kumar, V. Sharma, M. Alarakabi, S.C. Bedi, D. Mehta, N. Singh *presented in third Chandigarh Science Congress at Panjab University, Chandigarh 2009.*
- iii. Elemental analysis of Nano material using EDXRF technique, Sanjeev Kumar, V. Sharma, **Sunil Kumar**, G. Singh, D. Mehta and N. Singh, *presented in third Chandigarh Science Congress at Panjab University, Chandigarh 2009.*
- iv. Analytical applications of EDXRF technique, M. Oswal, V. Sharma, **Sunil Kumar**, R. Kaur, A. Srivastava, B. R. Behera, A. Kumar, D. Mehta, M. L. Garg and K.P Singh, *presented in third Chandigarh Science Congress at Panjab University, Chandigarh 2009.*
- v. Characterization of low energy germanium (LEGe) detector, Gurjeet Singh, S. Kumar, V. Sharma, **Sunil Kumar**, D. Mehta and N. Singh, *presented in third Chandigarh Science Congress at Panjab University, Chandigarh 2009.*
- vi. The presence of uranium in drinking water and its removal, M. Alarakabi, A. Bhalla, **Sunil Kumar**, S. Kumar, K.P. Singh, D. Mehta and N. Singh, *Presented in Recent Advances in Environmental Protection (RAEP 2009) International Conference & Exhibition Organized by Chemistry Department, St. John's College, Agra Venue: Hotel Clarks Shiraz, Agra, India December 17-19, 2009.*
- vii. Measurement of resonant Raman scattering contribution to characteristic X-ray attenuation in the various chemical forms of attenuator element, **Sunil Kumar**, Sanjeev Kumar, J. Goswamy, D. Mehta and N. Singh, *Presented in Punjab Science Congress held on 7-9 Feb, 2010.*
- viii. Effect of Coster-Kronig transition on the L_3 -subshell vacancy alignment in ^{58}Ce , ^{59}Pr and ^{60}Nd following photoionization, G. Singh, M. Alarakabi,, **Sunil Kumar**, A. Bhalla and S. Kumar, *Presented in Punjab Science Congress held on 7-9 Feb, 2010.*
- ix. Study of Chemical effect on L X-rays for ^{80}Hg , ^{82}Pb and ^{83}Bi elements, Gurjeet Singh, **Sunil Kumar**, Sanjeev Kumar, D. Mehta and N. Singh, *Presented in Chandigarh Science Congress held on 19-20 march, 2010.*
- x. Radiative resonant energy transfer during beam-foil excitation, T. Nandi, M. Oswal, **Sunil Kumar**, A. Jhingan, C.P. Safvan, S.R. Abhilash, and S. Karmakar, *presented in, Topical Conference on Atomic and Molecular Physics (TC2010), March 3-6, 2010, RRCAT, Indore, India.*

- xi. Trace element analysis of aerosol samples using PIXE technique, Mumtaz Oswal, Rajbir Kaur, B.P.Mohanty, **Sunil Kumar**, Sanjiv Kumar, B.R.Behera, A.Kumar, D.Mehta, M.L.Garg and K.P.Singh, *Presented in Chandigarh Science Congress held on 19-20 march, 2010.*
- xii. Investigations relevant to uranium contamination of ground water in Punjab, M. Alrakabi, G. Singh, A. Bhalla, **Sunil Kumar**, S. Kumar, Alok Srivastava, Bimal Rai, N. Singh, J.S. Shahi, D. Mehta, *presented in Fourth International Symposium on Nuclear Analytical Chemistry (NAC-IV), Bhabha Atomic Research Centre, Trombay, Mumbai, India, November 15-19, 2010.*
- xiii. Flyash from thermal power plant as a possible source of contamination of ground water, G. Singh, A. Bhalla, M. Alrakabi, **Sunil Kumar**, S. Kumar, N. Singh, J.S. Shahi and D. Mehta, *presented in International conference at KMV Jalandhar, Punjab (2010).*
- xiv. Investigations relevant to uranium contamination of ground water in Malwa region of Punjab state, A. Bhalla, M. Alrakabi, G. Singh, **Sunil Kumar**, S. Kumar, B. Rai, A. Srivastava, N. Singh, J.S. Shahi and D. Mehta, *presented in International conference at KMV Jalandhar, Punjab (2010).*
- xv. Measurements of L X-ray Intensity ratios for high-Z elements following ionization by ^{19}F ions, **Sunil Kumar**, M. Oswal, G. Singh, G. Lapicki, S.C. Bedi, T. Nandi, N. Singh, D. Mehta, *presented in Symposium on Radiation Physics and nanomaterials (NSRPN-11).*
- xvi. EDXRF monitoring of toxic elements in ground water of Malwa region in Punjab, M. Alrakabi, G. Singh, A. Bhalla, **Sunil Kumar**, S. Kumar, N. Singh, J.S. Shahi and D. Mehta, *presented in Symposium on Radiation Physics and nanomaterials (NSRPN-11).*
- xvii. Trace element analysis of aerosol samples using EDXRF and PIXE Technique, Mumtaz Oswal, **Sunil Kumar**, B.P.Mohanty, Rajbir Kaur, Sanjiv Kumar, B.R.Behera, A.Kumar, G. Singh, M.L.Garg and K.P.Singh, , *presented in Symposium on Radiation Physics and nanomaterials (NSRPN-11).*
- xviii. Measurements of L X-ray cross-sections for high-Z elements following ionization by ^{19}F ions, **Sunil Kumar**, M. Oswal, G. Singh, G. Lapicki, S.C. Bedi, T. Nandi, N. Singh, D. Mehta, *Presented in Chandigarh Science Congress held on 26-28 Feb, 2011.*
- xix. Measurements of L X-ray cross-sections for high-Z elements following ionization by ^{28}Si ions, M. Oswal, **Sunil Kumar**, G. Singh, G. Lapicki, K.P. Singh, T. Nandi, D. Mehta, *Presented in Chandigarh Science Congress held on 26-28 Feb, 2011.*
- xx. L x-ray production cross sections for ^{78}Pt , ^{79}Au , ^{82}Pb , ^{83}Bi , ^{90}Th and ^{92}U elements using $F^{+6,7,8}$ ions, **Sunil Kumar**, M. Oswal, G. Singh, G. Lapicki, S.C. Bedi, T. Nandi, N. Singh, D. Mehta, *Presented in Advanced Material and Radiation Physics symposium-2011 (AMRP-11) held at SLIET Longowal on 4-5 Nov., 2011.*
- xxi. Selective absorption filters for enhancing detection limit in case of EDXRF analysis using bremsstrahlung radiation, G. Singh, V. Gupta, G. Singh, Sunil Kumar and D. Mehta, *Presented in Advanced Material and Radiation Physics symposium-2011 (AMRP-11) held at SLIET Longowal on 4-5 Nov., 2011.*

- xxii. Study of the reactions ^{56}Fe , ^{58}Ni (^{12}C , $\alpha\alpha$) and formation of fully stripped ions in multi-nucleon transfer reaction, T. Nandi, B.J. Roy, B.P. Mohanty, M. Oswal, V. Jha, D.C. Biswas, A. Jhingan, **Sunil Kumar**, V. Singh, B. Kumar, K. Haris, *Presented in DAE, 2011 at Vishakhapatnam, Andhra Pradesh.*
- xxiii. L shell x-ray production in ultra-thin ^{76}Os using 4-6 MeV/u fluorine ions, Sunil Kumar, Sarvesh Kumar, Deepak Kr Swami, M. Oswal, N. Singh, D. Mehta, D.P. Goyal and T. Nandi, *7th Topical Conference of the Indian Society of Atomic and Molecular Physics (ISAMP), at the Indian Institute of Science Education and Research (IISER) Tirupati, and Indian Institute of Technology (IIT) Tirupati, Andhra Pradesh, India, from 6 to 8 January 2018.*
- xxiv. Characterization of thin aluminized polypropylene backed atomic targets using ~ 2 MeV He^+ ions at IUAC, New Delhi, Sarvesh Kumar, Sunil Kumar, Deepak Kumar Swami, G.R. Umopathy, D.P. Goyal, and T. Nandi, *7th Topical Conference of the Indian Society of Atomic and Molecular Physics (ISAMP), at the Indian Institute of Science Education and Research (IISER) Tirupati, and Indian Institute of Technology (IIT) Tirupati, Andhra Pradesh, India, from 6 to 8 January 2018.*