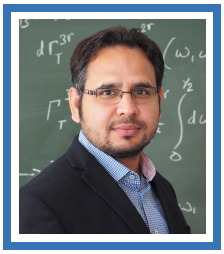

Sushil Sharma

Curriculum Vitae

Personal information

Corres. Address: **Via Sommarive 14, Trento 38123, Italy**.

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Academic Background

04/2021 - present: **INFN Postdoctoral Fellow in TIFPA**, *National research center of INFN*, Trento, Italy.

03/2017 - 03/2021: **Postdoctoral Fellow**, *Faculty of Physics, Astronomy and Applied Computer Science, Jagiellonian University*, Krakow, Poland.

07/2016 - 02/2017: **Postdoctoral Fellow**, *Faculty of Physics, University of Warsaw*, Warsaw, Poland.

02/2011 – 09/2015: **Ph.D. in Nuclear Physics (with Distinction)**, *Faculty of Physics, Astronomy and Applied Computer Science, Jagiellonian University*, Krakow, Poland. Dissertation Title: **"Validation of Spallation Models"**

04/2009– 12/2010: **Junior Research Fellow**, *Tata Institute of Fundamental Research center(T.I.F.R), Colaba*, Mumbai, India.

2006-2008: **Master in Science - Physics**, *University of Delhi, New Delhi*, **Secured 1st Division**, Delhi, India.

Research interests

- Positron Emission Tomography, Particle physics, Spallation physics, Nuclear fusion and fission reactions, Nuclear structure

- New hardware and software techniques and instrumentation in particle detection.

Research activities - Highlights

2009-2021 **in instrumentation, data acquisition, realization of nuclear physics experiments, in computer based raw data analysis and in model description of observables.**

Technical skills

- Working experiences with scintillation, silicon detectors. Extensive experiences in working with Germanium detectors.

Softwares and Programming language

Programming Language	C/C++ (intermediate level), PYTHON (intermediate level)
Scripting Language	SHELL
Analysis Packages	**ROOT**, **GEANT4**, SRIM, TRIM, PACE3, PACE4, CCFULL, LAMPS (Data Acquisition and Analysis Package)
Application Packages	XMGRACE, GNUPLOT, SIGMA PLOT, G3DATA, GIMP
Operating system	DOS, MICROSOFT WINDOWS, LINUX / UNIX

Scholarships / Awards / Achievements

- INFN Fellowship for non-itallian citizens 2019/2020, INFN, Italy.
- **Distinction** in PhD thesis titled as "Validation of spallation models".
- Polish Ministry of Science and Higher Education Award - Stipend for Outstanding Achievements for academic year 2014/2015.
- Scholarship in the framework of International PhD studies in applied nuclear physics and innovative technologies supported by the Foundation for Polish Science – MPD program, co-financed by the European Union within the European Regional development fund.
- Awarded with Junior Research Fellowship in the Department of Nuclear and Atomic Physics for the period of 2009 – 2011 in Tata Institute of Fundamental Research center (TIFR), Mumbai, India.

Projects undertaken

2008 Performed a Physics project during final year of master studies on *"Characteristics of Clover Detector"*, under the guidance of Dr. Rakesh Kumar, scientist-F , GDA/INGA group, in Inter University Accelerator Centre , New Delhi, India.

Teaching duties

2017 - Present Co-supervisor of a PhD student.

2013 - 2014 Laboratories exercises with Erasmus master student (ERASMUS).

Invited talks / seminars

2020 **Invited seminar** - Maitreyi Collegre, University of Delhi, January 23, 2020, Delhi, India.
Title:"*Recent trends in Nuclear and Medical physics*"

2020 **Invited talk** - Indian Institute of Technology Bombay, January 13−17, 2020, Mumbai, India.
Title:"*Jagiellonian Positron Emission Tomograph : From tests on fundamental symmetries to the applications in medical imaging*"

2019 **Invited talk** - International Conference on New Frontiers of Nuclear Physics (ICNFNP), October 14−17, 2019, Banaras Hindu University, Varanasi, India.
Title:"*Status and advancement in the studies of positronium atom decays with the J-PET*"

2019 **Invited seminar** - Indian Institute of Technology Ropar, January 11, 2019, Punjab, India.
Title:"*Positronium atom : a purely leptonic object to perfrom the tests on discrete symmetries*"

2018 **Plenary talk** - DAE International Symposium on Nuclear Physics, December 10−14, 2018, at Bhabha Atomic Research Centre, Mumbai, India.
Title:"*Studies of the decay of positronium atoms with the J-PET detector*"

2018 **Invited talk** - Workshop on "Discrete symmetries in particle, nuclear and atomic physics and implicaitons for our Universe", 08 October − 12 October, 2018, at European Centre for Theoretical Studies in Nuclear Physics and Related Areas(ECT) in Trento,Italy.
Title:"*Tests of discrete symmetries using polarization of the annihilation photons*"

2018 **Invited talk** - Is quantum theory exact? The quest for the spin-statistics connection violation and related items, 02 July − 5 July, 2018, at Laboratori Nazionali di Frascati INFN, Frascati, Italy.
Title:"*Tests of discrete symmetries in positronium decays with the J-PET detector*"

2018 **Invited seminar** - During the research visit, 02 January − 5 January, 2018, at Indian Institute of Technology Roorkee, Roorkee, India.
Title:"*J -PET potentialities in medical imaging and test of discrete symmetries*"

Poster / oral presentation in conferences

2021 **Oral** - *Modular J-PET applications in medical and particle physics*, International Conference on Technology and Instrumentation in Particle Physics, May 24−28, 2021, Triumf, Canada.

2020 **Oral** - *Decay rate of o-Ps atoms in the framework of J-PET detector*, Workshop: Investigating the Universe with exotic atomic and nuclear matter, September 29−30, 2020, INFN Frascati, Italy.

2019 **Oral** - *Efficiency determination of JPET detector based on photon's scattering*, Is Quantum Theory exact? From quantum foundations to quantum applications?, September 23−27, 2019, INFN Frascati, Italy.

2019 **Oral** - *TOT method for the disentanglement of photons in Positron Annihilation Lifetime Spectroscopy*, 15^{th} International Workshop on Slopw Positron Beam Techniques and Applications (SLOPOS−15), September 2−6, 2019, Prague, Czech Republic.

2019 **Poster** - *Towards total-body modular PET for positronium and quantum entanglement imaging*, FNP IIIrd Inter Deciplinary Congress meeting, Warsaw, Poland.

2018 **Poster** - *Towards total-body modular PET for positronium and quantum entanglement imaging*, IEEE Nuclear Science Symposium and Medical Imaging Conference, November 10-17, 2018, Sydney, Australia.

2018 **Poster** - *Pilot studies towards positronium imaging with the total-body PET scanners*, IEEE Nuclear Science Symposium and Medical Imaging Conference, November 10 -17, 2018, Sydney, Australia.

2018 **Poster** - *Charge conjugation symmetry test in the decay of para-positronium atoms using the J-PET detector*, Discrete symmetries in particle, nuclear and atomic physics and implications for our universe, October 8-12, 2018, Trento, Italy.

2018 **Talk** - *Studies of the polarization of gamma photons originating from the decay of positronium atoms*, 18^{th} International Conference on Positron Annihilation, Orlando, USA

2018 **Poster** - *Time Over Threshold as a measure of energy loss by incident gamma in the J-PET scanner*, Total Body Pet - From mice to men, Ghent, Belgium.

2018 **Poster** - *Time Over Threshold as a measure of energy response of plastic scintillators used in the J-PET detector*, 15^{th} International Conference on Meson Physics, Krakow, Poland.

2018 **Poster** - *Beta-delayed charged-particle emission from* ^{23}Si, XXII International Scientific Conference of Young Scientists and Specialists in Dubna, Russia

2017 **Poster** - *Time over Threshold (TOT) as a measure of Energy deposition by gamma quanta in plastic scintillator used in J-PET*, International workshop on Positron and positronium chemistry, **Awarded with Best Poster**, 28 August − 1 September, Lublin, Poland.

2015 **Oral** - *Validation of spallation models;*, Jagiellonian Symposium on Fundamental and Applied Subatomic Physics, June 7 - 13, Krakow, Poland.

2014 **Oral** - *Proton induced spallation reaction;*, II Symposium on Applied Nuclear Physics and Innovative Technologies, September 24 - 27, Krakow, Poland.

2013 **Oral** - *Validation of spallation models: An approach;*, Symposium on Applied Nuclear Physics and Innovative Technologies, June 03 - 06, Krakow, Poland.

2013 **Poster** - *Influence of projectile energy and target mass on the production of light charged particles and intermediate mass fragments in proton induced reactions*, ND2013, March 4 - 8, in New York, USA.

2010 **Poster** - *Fusion of* ^{7}*Li with* ^{124}*Sn at around coulomb barrier energies*, DAE Symposium on Nuclear Physics, December 20-24, Pilani, India.

Books and monograph published:

2019 Basic Concepts in Nuclear Physics: Theory, Experiments and Applications,2019, **Chapter: 38**, Publisher: SPRINGER.
Title:"*Investigation of the Mechanism of Proton Induced Spallation Reactions*"

Conferences / Workshops / Seminars / Schools

2021 International Conference on Technology and Instrumentation in Particle Physics (TIPP - Online format), May 24−28, 2021, Triumf, Canada.

2020 Workshop : Investigating the Universe with exotic atomic and nuclear matter), September 29−30, 2020, INFN Frascati, Frascati, Italy.

2019 International Conference on New Frontiers of Nuclear Physics (ICNFNP), October 14−17, 2019, Banaras Hindu University, Varanasi, India.

2019 Is Quantum Theory exact? From quantum foundation to quantum applications, September 23−27, 2019, INFN, Frascati, Italy.

2019 15^{th} International Workshop on Slow Positron Beam Techniques and Applications (SLOPOS-15), September 2−6, 2019, Prague, Czech Republic.

2019 3rd Jagiellonian Symposium on Fundamental and Applied Subatomic Physics-DAE International Symposium on Nuclear Physics, June 23−28, 2019, at Jagiellonian University, Krakow, Poland. - **Scientific Secretary**

2018 DAE International Symposium on Nuclear Physics, December 10−14, 2018, at Bhabha Atomic Research Centre, Mumbai, India.

2018 Workshop on "Discrete symmetries in particle, nuclear and atomic physics and implicaitons for our Universe", 08 October − 12 October, 2018, at European Centre for Theoretical Studies in Nuclear Physics and Related Areas(ECT) in Trento,Italy

2018 18^{th} International Conference on Positron Annihilation, 19 August − 24 August, in Orlando, USA.

2018 Total Body PET - From mice to men, 30 June − 2 July, in Ghent, Belgium.

2018 15^{th} International workshop on Meson Physics, 07 June − 12 June, in Krakow, Poland.

2017 12^{th} International workshop on Positron and positronium chemistry, 28 August − 1 September, in Lublin, Poland.

2017 ^{2nd}Jagiellonian Symposium on Fundamental and Applied Subatomic Physics, June, in Krakow, Poland.

2015 Jagiellonian Symposium on Fundamental and Applied Subatomic Physics, June 7 - 13, in Krakow, Poland.

2014 II Symposium on Applied Nuclear Physics and Innovative Technologies, September 24 - 27, in Krakow, Poland. - **Co-organizer**

2014 13th International Workshop on Meson Production, Properties and Interaction, from 29 May - 3 June, in Krakow, Poland. - **Co-organizer**

2013 Symposium on Applied Nuclear Physics and Innovative Technologies, June 03 - 06, in Krakow, Poland. - **Co-organizer**

2013 International Conference on Nuclear Data for Science and Technology (ND2013), March 4 - 8, in New York, USA.

2012 12th International Workshop on Meson Production, Properties and Interaction, from 31 May - 5 June, Krakow, Poland.

2010 TIFR - ARGONNE interaction meeting, held at Tata Institute of Fundamental Research Centre, Homi Bhabha Road, Mumbai 400 005, India.

2009 International Symposium on Nuclear Physics, held at Bhabha Atomic Research Centre, Mumbai, India during December 8 - 12.

2009 School cum Workshop on Yrast and Non-Yrast spectroscopy, held at Indian Institute of Technology(IITR), Roorkee, India.

List of publications

1. *3D TOF-PET image reconstruction using the total variation regularization;* L. Raczyński, **S. Sharma** et al., IEEE Transactions on Radiation and Plasma Medical Sciences 4 (2020) 528 (Pages 10).
2. *Hit-time and hit-position reconstruction in strips of plastic scintillators using multi-threshold readouts;* N.G. Sharma, **S. Sharma** et al., IEEE Transactions on Radiation and Plasma Medical Sciences 4 (2020) 528 (Pages 10).
3. *Synchronisation and calibration of the 24-modules J-PET prototype with 300 mm axial field of view;* P. Moskal, **S. Sharma** et al., IEEE Trans. on Inst. and Measur. 70 (2020) 2000810 (Pages 10)
4. *Performance assessment of the 2gamma positronium imaging with the total-body PET scanners;* P. Moskal, **S. Sharma** et al., EJNMMI Phys 7, 44 (2020)(Pages 16)
5. *Estimating relationship between the Time Over Threshold and energy loss by photons in plastic scintillators used in the J-PET scanner;* **S. Sharma** et al., EJNMMI Phys 7, 39 (2020)(Pages 15)
6. *Monte Carlo N-Particle simulations of an underwater chemical threads detection system using neutron activation analysis;* P. Sibczynski,.., **Sushil Sharma**, Journal of Instrumentation 14 (2019) P09001

7. *Odd-even staggering in the yields of intermediate mass fragments from p+Ag collisions at E_p = 480 MeV;* U. Singh, B. Kmays, **Sushil K. Sharma**, K. Pysz, Acta Physica Polonica B 50 (2019) 1451
8. *Feasibility study of the positronium imaging with the J-PET tomograph;* P. Moskal,..,**S. Sharma** et al., Phys. Med. Bio. 64 (2019) 055017
9. *Simulation studies of annihilation-photon'spolarisation via Compton scattering with the J-PETtomograph;* N. Krawczyk,..,**S. Sharma** et al., Hyperfine Interact (2019) 240:81
10. *Feasibility studies of the polarization of photons beyond the optical wavelength regime with the J-PET detector;* P. Moskal,..,**S. Sharma** et al., Eur. Phys. J. C 78 (2018) 970
11. *Feasibility study of the time reversal symmetry tests in decays of metastable positronium atoms with the J-PET detector;* A. Gajos,..,**S. Sharma** et al., Advances in High Energy Physics Volume 2018, Article ID 8271280, Link: https://doi.org/10.1155/2018/8271280
12. *Estimation of the NEMA characteristics of the J-PET tomograph using the GATE package;* P. Kowalski,..,**S. Sharma** et al., Physics in Medicine and Biology 63 (2018) 165008
13. *Evaluation of Single-Chip, Real-Time Tomographic Data Processing on FPGA - SoC Devices;* G. Korcyl,..,**S. Sharma** et al., IEEE Transactions On Medical Imaging 37, 11 (2018) 2526
14. *Commissioning of the J-PET detector in view of the positron annihilation lifetime spectroscopy;* K. Dulski,..,**S. Sharma** et al., Hyperfine Interact (2018) 239:40
15. *A feasibility study of the time reversal violation test based on polarization of annihilation photons from the decay of ortho-Positronium with the J-PET detector;* J. Raj,..,**S. Sharma** et al., Hyperfine Interact (2018) 239:56
16. *Fusion reaction studies for the $^{6}Li+$ ^{124}Sn system at near barrier energies;* V. V. Parkar,..,**Sushil K. Sharma** et al., Phys. Rev. C 98 (2018) 014601
17. *The predictive power of spallation models for isotopic cross-sections;* U. Singh,..,**Sushil K. Sharma** et al., Eur. Phys. J. A 54 (2018) 109
18. *Investigation of complete and incomplete fusion in $^{7}Li+^{124}Sn$ reaction around Coulomb barrier energies;* V.V.Parkar, **Sushil K. Sharma** et al., Phys. Rev. C 97 (2018) 014607
19. *Non-equilibrium processes in p + Ag collisions at GeV energies;* M. Fidelus,.., **Sushil K. Sharma** et al., Phys. Rev. C 96 (2017) 064618
20. *Ranking and validation of spallation models for isotopic production cross sections of heavy residua;* **Sushil K. Sharma**, B. Kamys, F. Goldenbaum , D. Filges, Eur. Phys. J. A 53 (2017) 150.
21. *High-spin states in ^{133}Cs and the shell model description;* S. Biswas,.., **S. Sharma** et al., Phys. Rev. C 95 (2017) 064320.

22. *Ranking and validation of the spallation models for description of intermediate mass fragment emission from p+Ag collisions at 480 MeV incident proton beam energy;* **Sushil K. Sharma**, B. Kamys, F. Goldenbaum , D. Filges, Eur. Phys. J. A 52 (2016) 171.
23. *Dependence and Influence of Projectile Energy and Target Mass on the Production of Light Charged Particles and Intermediate Mass Fragments in Proton Induced Reactions;* **S. K. Sharma**, D. Filges, F. Goldenbaum, B. Kamys, Nuclear Data Sheets 119 (2014) 307.
24. *Sequential and simultaneous emission of particles from p + Al collisions at GeV energies;* M. Fidelus,.., **Sushil K. Sharma** et al., Phys. Rev. C 89 (2014) 054617.
25. *Validation of spallation models for p+Al reactions at 180 MeV incident proton beam energy ;* **Sushil K. Sharma**, B. Kamys, F. Goldenbaum and D.Filges, Acta Physica Polonica. B 45 (2014) 1963.
26. *Complete fusion in* $^{7}Li + ^{144,152}Sm$ *reactions;* P. K. Rath,..,**Sushil K. Sharma** et al., Phys. Rev. C 88 (2013) 044617.
27. *High spin states in* $^{135}La_{78}$*;* Ritika Garg,..,**Sushil K. Sharma** et al., Phys. Rev. C 87 (2013) 034317.
28. *A high speed digital data acquisition system for the Indian National Gamma Array at Tata Institute of Fundamental Research;* R. Palit,.., **S. Sharma** et al., Nucl. Inst. and Meth. in Phys. Res. A 680 (2012) 90.
29. *Fusion reaction studies for the* $^{6}Li + ^{90}Zr$ *system at near-barrier energies;* H. Kumawat,..,**Sushil K. Sharma** et al., Phys. Rev. C 86 (2012) 024607.
30. *Complete and incomplete fusion in* $^{9}Be + ^{124}Sn$ *system;* V. V. Parkar,.., **Sushil K. Sharma** et al., Proc. Radiochim. Acta 1 (2011) 131.
31. *Structural change of the unique-parity* Π *h11/2* $\otimes$ *11/2 configuration in* ^{134} *Cs;* H. Pai,..,**Sushil K. Sharma** et al., Phys. Rev. C 84 (R) (2011) 041301.
32. *Fusion cross sections for the* $^{9}Be + ^{124}Sn$ *reaction at energies near the Coulomb barrier;* V. V. Parkar,.., **Sushil K. Sharma** et al., Phys. Rev. C **82** (2010) 054601.

Conference proceedings (refereed) :

33. *TOT method for the disentanglement of photons in Positron Annihilation Lifetime Spectroscopy;* **S. Sharma** et al., accepted to be published in Acta Physica Polonica A (2020).
34. *Studies of the polarization of gamma photons originating from the decay of positronium atom;* **S. Sharma** et al., AIP Conference Proceedings 2182, 050027 (2019).
35. *Time Over Threshold as a measure of energy response of plastic scintillators used in the J-PET detector;* **Sushil Sharma**, EPJ Web of Conferences 199 (2019) 05014

36. *A TPC detector for studying photo-nuclear reactions at astrophysical energies with gamma-ray beams at ELI-NP;* M. Cwiok, **Sushil Sharma**, Acta Phys. Pol. B 49, 3 (2018)
37. *A Method to Produce Linearly Polarized Positrons and Positronium Atoms with the J-PET Detector;* M. Mohammad,.., **S. Sharma** et al., Acta Phys. Polon. A 132 (2017) 1486
38. *Human Tissue Investigations Using PALS Technique - Free Radicals Influence;* B. Jasińska,.., **S. Sharma** et al.,Acta Phys. Polon. A 132 (2017) 1556
39. *Preliminary Studies of J-PET Detector Spatial Resolution;* M. Pawlik-Niedzwiecka,.., **S. Sharma** et al., Acta Phys. Polon. A 132 (2017) 1645
40. *Underwater detection of dangerous substances: status of the SABAT project;* M. Silarski,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1675
41. *Analysis procedure of the positronium lifetime spectra for the J-PET detector;* K. Dulski,.., **S. Sharma** et al., Acta Phys. Polon. A 132 (2017) 1637
42. *Introduction of total variation regularization into filtered backprojection algorithm;* L. Raczynski,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1611
43. *Time calibration of the J-PET detector;* M. Skurzok,.., **S. Sharma** et al., Acta Phys. Polon. A 132 (2017) 1641
44. *J-PET: A New Technology for the Whole-body PET Imaging;* S. Niedzwiecki,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1567
45. *Human Tissues Investigation Using PALS Technique;* M. Mohammad,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1737
46. *Three-dimensional Image Reconstruction in J-PET Using Filtered Back-projection Method;* R.Y. Shopa,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1757
47. *Commissioning of the J-PET Detector for Studies of Decays of Positronium Atoms;* E. Czerwinski,.., **S. Sharma** et al., Acta Phys. Polon. B 48 (2017) 1961
48. *Angular Asymmetry in the Production of Light and Heavy Recoil Nuclides in Proton Induced Reactions with Au Target at GeV energies;* **S. K. Sharma** and B. Kamys, Acta. Physica. Polonica. A 127(2015) 1533.

Symposium / workshop proceedings :

49. *Validation of spallation models: An Approach;* Sushil K. Sharma, Acta Physica Polonica B Proc. supp. 6 (2013) 1161.
50. *Studies of the decay of positronium atoms with the J-PET detector;* Sushil K. Sharma, Proceedings of the DAE symp. on Nucl. Phys. 63 (2018)
51. *Fission cross sections for* $^{6,7}Li+^{235}U$*;* A. Parihari,.., Sushil K. Sharma et al., Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) 618.

52. *Study of Magnetic Rotation in mass A = 135 region;* Ritika Garg,.., Sushil K. Sharma et al., Proceedings of the DAE Symp. on Nucl. Phys. 56 (2011) 218.

53. *Fusion of ^{7}Li with ^{124}Sn at around Coulomb barrier energies;* Sushil K. Sharma et al., Proceedings of the DAE Symp. on Nucl. Phys. 55 (2010)296.

54. *High spin spectroscopy of ^{134}Cs;* H.Pai,..,S. Sharma et al., Proceedings of the International Symposium on Nuclear Physics (2009)88.

Krakow: May 21, 2021 **Sushil Sharma**