

Sruthil Lal Sumabalakrishnan

PERSONAL DATA

PLACE AND DATE OF BIRTH: Calicut, Kerala- India | 25 November 1992
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RESEARCH INTERESTS

Design of experiments and simulations to probe optical nonlinearities in variety of materials, addressing the influence of light properties on the nonlinear polarization. I routinely rely on the following techniques in combination;

- Femtosecond Z-Scan : to characterize the nonlinear refraction and absorption in materials
- Nonlinear Stokes-muller polarimetry to study the polarization dependent nonlinear optical response
- Density functional theory and Many-body perturbation theory (G_0W_0 & BSE) to compute the structural, electronic and optical properties of materials
- Time-dependent density functional theory for ab-initio simulations of ultrafast electron dynamics

RESEARCH EXPERIENCE

AUG. 2016- PRESENT	DOCTORAL STUDENT IN NONLINEAR OPTICS Department of Physics, Pondicherry University, India Thesis: Investigation of the origin of optical nonlinearities in anatase polymorph of Titanium dioxide using ultrafast laser experiments and ab-initio simulations based on density functional theory (DFT), many body perturbation theory (MBPT) and time dependent density functional theory (TDDFT)
AUG. 2014- MAY 2015	LABVIEW BASED AUTOMATION OF PUMP-PROBE SPECTROSCOPY Master's thesis work under the supervision of Dr. Alok Saran, Department of Physics, Pondicherry University <ul style="list-style-type: none">• Completed automation of Pump-Probe spectroscopy Experiment set up at Ultrafast Laser Laboratory, Central Instrumentation Facility at Pondicherry University.• Interfaced Newport motion controller, linear stages and power meters with PC and automated experiment control, data acquisition, in-line data visualisation, data logging and reporting while performing the experiment.• Mastered LabVIEW based automation of experimental set up involving Newport®-XPS-Q8 Motion controller, and 842-PE power meter hardware.
MAY 2014- JULY 2014	ASSOCIATED ABSORPTION LINE SYSTEMS: A TOOL TO UNDERSTAND THE COOL GAS OUTFLOWS Summer Research Fellow , under the guidance of Dr. Hum Chand, Scientist D, at Aryabhata Research Institute of Observational Sciences, Nainital- India
APRIL- JUNE 2012	DARK MATTER AND GRAVITATIONAL LENSING Reading project done as a Summer Research Fellow under the guidance of Prof. Pushpa Khare, at Inter-University Centre for Astronomy and Astrophysics, Pune- India

PUBLICATIONS

1. **S. B., Sruthil Lal**, Murali, D., Posselt, M., Devi, A. A. S., & Sharan, A. (2021). Quasiparticle electronic structure and optical response (G_0W_0 + BSE) of anatase TiO_2 starting from modified HSE06 functionals. arXiv preprint arXiv:2112.03027.
2. Shaji, C., **S. B., Sruthil Lal**, & Sharan, A. (2021). Study of a bi-axial (KTP) crystal using Double Stokes Mueller Polarimetry. arXiv preprint arXiv:2111.05595.
3. **S. B., Sruthil Lal**, Murali, D., Posselt, M., & Sharan, A. (2020, November). Accurate determination of quasi-particle electronic and optical spectra of anatase titanium dioxide. In AIP Conference Proceedings (Vol. 2265, No. 1, p. 030375). AIP Publishing LLC.
4. Anju, V. T., Paramanatham, P., Siddhardha, B., **S. B., Sruthil Lal**, Sharan, A., Alyousef, A. A., Arshad, M. & Syed, A. (2019). Malachite green-conjugated multi-walled carbon nanotubes potentiate antimicrobial photodynamic inactivation of planktonic cells and biofilms of *Pseudomonas aeruginosa* and *Staphylococcus aureus*. International Journal of Nanomedicine, 14, 3861.
5. Paramanatham, P., Siddhardha, B., **S. B., Sruthil Lal**, Sharan, A., Alyousef, A. A., Al Dosary, M. S., & Syed, A. (2019). Antimicrobial photodynamic therapy on *Staphylococcus aureus* and *Escherichia coli* using malachite green encapsulated mesoporous silica nanoparticles: an in vitro study. PeerJ, 7, e7454.
6. Anju, V. T., Paramanatham, P., **S. B., Sruthil Lal**, Sharan, A., Syed, A., Bahkali, N. A. & Busi, S. (2019). Antimicrobial photodynamic activity of toluidine blue-carbon nanotube conjugate against *Pseudomonas aeruginosa* and *Staphylococcus aureus*-understanding the mechanism of action. Photodiagnosis and photodynamic therapy, 27, 305-316.
7. Parasuraman, P., Antony, A. P., **S. B., Sruthil Lal**, Sharan, A., Siddhardha, B., Kasinathan, K., Bahkali, N. A., Dawoud, Turki M. S. & Syed, A. (2019). Antimicrobial photodynamic activity of toluidine blue encapsulated in mesoporous silica nanoparticles against *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Biofouling, 35(1), 89-103.
8. Parasuraman, P., Anju, V. T., **S. B., Sruthil Lal**, Sharan, A., Busi, S., Kaviyarasu, K., Arshad, M., Dawoud, Turki M. S., & Syed, A. (2019). Synthesis and antimicrobial photodynamic effect of methylene blue conjugated carbon nanotubes on *E. coli* and *S. aureus*. Photochemical & Photobiological Sciences, 18(2), 563-576.
9. Anju, V. T., Paramanatham, P., **S. B., Sruthil Lal**, Sharan, A., Alsaedi, M. H., Dawoud, T. M., & Busi, S. (2018). Antimicrobial photodynamic activity of rose bengal conjugated multi walled carbon nanotubes against planktonic cells and biofilm of *Escherichia coli*. Photodiagnosis and Photodynamic Therapy, 24, 300-310.

CONFERENCE PRESENTATIONS

1. **S. B., Sruthil Lal**, Murali, D., Posselt, M., & Sharan, (2021, February). Optical response of anatase TiO_2 : The role of exact exchange on predicting exciton binding energy. In 29th DAE - BRNS National Laser Symposium, India
2. **S. B., Sruthil Lal**, Murali, D., Posselt, M., & Sharan, (2019, December). Accurate determination of Quasi-Particle Electronic and Optical Spectra of Anatase Titanium Dioxide. In 64th DAE Solid State Physics Symposium, Indian Institute of Science Jodhpur, Rajasthan, India

3. Shaji, C., Lal, S. B., Sruthil Lal, & Sharan, A. (2017, July). Double Mueller matrix measurement of KTP crystal. In Conference on Lasers and Electro-Optics/Pacific Rim (p. s1900). Optical Society of America.
4. Shaji, C., S. B., Sruthil Lal, & Sharan, A. (2017, April). Double Stokes-Mueller polarimetry in KTP (Potassium Titanyl Phosphate) crystal. In APS Division of Atomic, Molecular and Optical Physics Meeting Abstracts (Vol. 2017, pp. N4-010).
5. Chakravarthy, G., C., Allam, S. R., Ghosh, O. S. N., Gayathri, S., S. B., Sruthil Lal, Viswanath, A. K., Sharan, A., (2017), Nonlinear Phase Shift of Au and Mn doped TiO₂ nanoparticles, Proceedings of DAE-BRNS Theme Meeting on Ultrafast Science, Hyderabad, India
6. S. B., Sruthil Lal, Murali, D., Chakravarthy, G., C., Allam, S. R., Ghosh, O. S. N., Gayathri, S., Sharan, A., (2017) Probing the origin of optical nonlinearities in anatase pristine and Ag: Doped Nanoparticles through DFT approach, Proceedings of DAE-BRNS Theme Meeting on Ultrafast Science, Hyderabad, India
7. Chakravarthy, G., C., Allam, S. R., Ghosh, O. S. N., Gayathri, S., S. B., Sruthil Lal, Viswanath, A. K., Sharan, (2017). Influence of Ag Doping on the third order Nonlinear optical Characteristics of TiO₂ nanoparticles using femtosecond z-scan, Proceeding of International Workshop on Advanced Functional Materials and Devices(IWAFMD), Thirunelveli

EDUCATION

AUG. 2016- PRESENT	Doctor of Philosophy in Physics Department of Physics, Pondicherry University, India Advisor: Dr. Alok Sharan
JULY 2013- MAY 2015	Master of Science in Physics Pondicherry University, Puducherry, India Thesis: "Labview Based automation of Pump-probe Spectroscopy" Advisor: Dr.Alok Sharan CGPA: 7.68/10
AUG. 2010- APR. 2013	Bachelor of Science in Physics Calicut University, Calicut, Kerala, India Thesis: "Characterization of stars in globular clusters pal3 and pal5 of Sloan Digital Sky Survey data release 7" Advisor: Mr. Albert Thomas, Assistant Professor, St. Joseph's college Devagiri, Calicut University, Kerala CGPA: 9.3/10

SKILLS AND EXPERIENCES

AUTOMATION & PROGRAMMING	<ul style="list-style-type: none"> • Automation of z-scan and pump-probe experiment using LabVIEW software • Data processing and visualization in bash, python and matlab
AB-INITIO SIMU- LATION	<ul style="list-style-type: none"> • VASP, QuantumESPRESSO, Octopus packages • Calculation of ground state electronic structure with DFT, quasiparticle electronic structure and optical response including many-body correlations with <i>GW</i>+BSE, Ultrafast electron dynamics in solids with TDDFT

MENTORING EXPERIENCE

- Resource person for faculty development program (online) - Nanomaterials: Experimental Design and Theoretical Modeling organized by Department of Sciences, IITDM, Kurnool, Andhra Pradesh, India (February, 2021)
- 14 Masters(6 ongoing and 8 completed) and 4 undergraduate research projects
- Teaching assistant for undergraduate and post-graduate laser based optics Laboratory in Pondicherry university (4 years)