

Rabisankar Samanta, Ph.D.

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RESEARCH INTERESTS

Current: Developing various optical modalities based on **interferometric diffuse optics** to monitor deep tissue physiology and image deep structures.

Past: Photon transport in $\chi^{(2)}$ -nonlinear disordered media, Second-harmonic generation, Wavefront shaping, Harmonic Nanoparticles, speckle statistics.

WORK EXPERIENCE

- | | |
|---|---|
| • NYU Langone Health, Tech4Health Institute
<i>Postdoctoral Fellow, Neurophotonics Lab, PI: Prof. Vivek J. Srinivasan</i> | New York, USA
<i>Feb 2024 -present</i> |
| • Tata Institute of Fundamental Research
<i>Research Associate, Nano-Optics & Mesoscopic Optics Laboratory</i> | Mumbai, India
<i>Oct 2023 - Jan 2024</i> |

EDUCATION

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| • Tata Institute of Fundamental Research
<i>Ph.D. in Physics, Advisor: Prof. Sushil Mujumdar</i> | Mumbai, India
<i>Feb 2019 - Jan 2024</i> |
| • Tata Institute of Fundamental Research
<i>M.Sc. in Physics</i> | Mumbai, India
<i>Aug 2016 - Jan 2019</i> |
| • Midnapore College (Autonomous), Vidyasagar University
<i>B.Sc. in Physics</i> | Midnapore, W.B., India
<i>Jul 2013 - Jun 2016</i> |

PUBLICATIONS

Patents

1. "HYBRID OPTICAL MEASUREMENT SYSTEMS, DEVICES, AND METHODS"

R. Samanta, Vivek J. Srinivasan, Julien Bec, Andrew Trapp, and Laura Marcu

US patent filed (US 63/962,050)

Journal articles

(*equal contribution, + corresponding author)

7. **R. Samanta***, R. Savo*, C. Conti, and S. Mujumdar⁺, "Second-order nonlinear disordered photonic media", [arXiv:2504.14589 \(2025\)](#)[\[arxiv\]](#).

6. D. Mazumder, S. Aparanji, O. Kholiqov, D. Hamilton, **R. Samanta**, and V. J. Srinivasan⁺, "1060 nm interferometric near-infrared spectroscopy." [Opt. Lett. 50, 2382-2385 \(2025\)](#)

5. **R. Samanta**, S. K. Upadhyay and S. Mujumdar⁺, "Interference among the neighboring sub-micron size harmonic particles." [Opt. Comm. 563, 130549 \(2024\)](#)

4. **R. Samanta**, R. Pierrat, R. Carminati, and S. Mujumdar⁺, "Photon diffusion in space and time in a second-order nonlinear disordered medium." [Phys. Rev. A 108, 053501 \(2023\)](#) [\[arXiv\]](#) .

3. **R. Samanta** and S. Mujumdar⁺, "Controlling the transmission of broadband light through scattering media using a Digital Micromirror Device." [Opt. Lett. 48, 4241-4244 \(2023\)](#)

2. **R. Samanta**, R. Pierrat, R. Carminati, and S. Mujumdar⁺, "Speckle decorrelation in fundamental and second-harmonic light scattered from nonlinear disorder", [Phys. Rev. Applied 18, 054047 \(2022\)](#) [\[arxiv\]](#).

1. **R. Samanta** and S. Mujumdar⁺, "Intensity-dependent speckle contrast of second harmonic light in a nonlinear disordered medium", [Appl. Opt. 59\(36\), 11266-11272 \(2020\)](#)

Book Chapters

1. "Dielectric and Metallodielectric Nanophotonics and Optical Confinement", S. Mujumdar, **R. Samanta** and S. Mondal

Book: Nanoscopy and Nanospectroscopy, CRC Press, Taylor & Francis Group (2023) [\[Link\]](#)

Conference proceedings

[†]presenter in the conference

7. **R. Samanta**[†], W. Zhou, and V. J. Srinivasan, “Free-space interferometric diffusing wave spectroscopy with an 8-bit camera”, in *Optica Biophotonics Congress 2026, Technical Digest Series* (Optica Publishing Group, 2026), paper BW1B.2.
6. A. Thrapp[†], **R. Samanta**, X. Liu, J. Bec, D. Mazumder, V. J. Srinivasan, and L. Marcu, “Combined fluorescence lifetime imaging and speckle modulation interferometric near infrared spectroscopy for burn assessment”, *Proc. SPIE PC13841, Multimodal Biomedical Imaging XXI, PC1384108* (6 Mar 2026).
5. D. Mazumder[†], S. Aparanji, O. Kholiqov, D. Hamilton, H. E. Garcia, **R. Samanta**, and V. J. Srinivasan, “Interferometric near-infrared spectroscopy (iNIRS) at 1060 nm”, *Proc. SPIE PC13302, Clinical and Translational Neurophotonics 2025, PC133020D* (19 Mar 2025).
4. **R. Samanta**[†], D. Mazumder, O. Kholiqov, and V. J. Srinivasan, “Dynamic speckle-modulated interferometric near-infrared spectroscopy of non-ergodic samples.”, in *Optica Biophotonics Congress 2025, Technical Digest Series* (Optica Publishing Group, 2025), paper BW1B.2.
3. **R. Samanta**[†], S. K. Upadhyay, and S. Mujumdar, “Interference effect in the second harmonic light emitted from sub-micron size particles”, .
2. **R. Samanta**[†], R. Pierrat, R. Carminati, and S. Mujumdar, “Intensity-dependent speckle correlation in a disordered, second-order nonlinear medium”, *OSA Nonlinear Optics Topical Meeting 2021. Paper id: NF2B. 5*
1. A. K. Tiwari[†], **R. Samanta**, S. Ajmal, and S. Mujumdar, “Random lasing from amplifying electrostatic spray of charged microjets” *2019 Workshop on Recent Advances in Photonics (WRAP), Guwahati, India, 2019, pp. 1-3*

EXPERTISE AND SKILLS

- **Laser Sources:** Mode-locked femtosecond laser (Coherent, Chameleon Vision S) and Q-switched Nd: YAG pulsed laser (nanosecond & picosecond), supercontinuum laser, Swept-source DBR & DFB Laser, tunable IR Laser, DPSS laser, He-Ne laser.
- **Detectors & Tools:** EMCCD (Andor iXon Ultra 897), Digital Micromirror Device (DMD, Vialux-650L), Ultra-fast Streak camera, Multi-Pixel Photon Counter (MPPC, Hamamatsu), high-speed digitizers (AlazarTech ATS 9416), Ultra-fast Pockel cells, Integrating Sphere, Dual-axis Galvo (Thorlabs, GVS002), visible and IR Photo-diode, CMOS and CCD camera in visible and IR, SPAD, PMT, balanced photo-detector.
- **Optics & Opto-mechanics:** Optical elements in VIS and NIR range, Opto-mechanics.
- **Fiber:** single & multimode fibers in the visible and NIR ranges, fiber splicing, tapered fiber & nano-tip making.
- **Coding and Analysis:** MATLAB, Python, LabVIEW, Digital Signal Processing.

ACADEMIC HONORS AND AWARDS

- Recipient of the **Infosys-TIFR Leading Edge Travel Grant (2022)**.
- **Best Poster Award** at **OSA IONS Manipal 2019**, India.
- Secured a rank among top 1% National students in **National Graduate Physics Examination (NGPE) 2016**.
- All India Rank 34 in **Joint Entrance Screening Test (JEST) 2016** (National level exam for admission in Int. Ph.D./Ph.D. courses).
- **DST INSPIRE Fellow** (2013-2016) from Govt. of India. (Secured a rank among the top 1% in Higher Secondary Board Exam and studying in any basic science stream).
- Recipient of **Central Sector Scheme of Scholarship** for College and University Students from MHRD (now Ministry of Education), Govt. of India.

PRESENTATIONS

(IT - Invited Talk, CT - Contributory Talk, P - Poster)

At Conferences/Seminars/Workshops:

- *Free-space interferometric diffusing wave spectroscopy with an 8-bit camera.* (CT)
Optica Biophotonics Congress, 26th-29th April 2026, Fort Lauderdale, USA.
- *Dynamic Speckle Modulated interferometric Near Infrared Spectroscopy (DSM-iNIRS) for non-ergodic samples.* (CT)
Optica Biophotonics Congress, 20th-24th April 2025, San Diego, USA.
- *Interference among the neighboring harmonic nanoparticles.* (P)
International Conference on Advanced Materials: Properties and Applications (ICAM), 20th-24th February 2023, Goa University, Goa, India.
- *Intensity-dependent speckle decorrelation in fundamental and second-harmonic light scattered from nonlinear disorder.* (CT)
Complex Nanophotonics Science Camp 2022, 2nd-5th August 2022, Cumberland Lodge, Windsor Great Park, London, UK. par
- *Interference effect in the second harmonic light emitted from sub-micron size particles.* (CT)
IEEE Workshop on Recent Advances in Photonics (WRAP 2022), 4th-6th March 2022, IIT Bombay, India. (Online)
- *Intensity-dependent speckle correlation in a disordered, second-order nonlinear medium.* (CT)
OSA Nonlinear Optics Topical Meeting 2021, 9th-13th August 2021 (Online).
- *Speckle decorrelation and contrast variation in disordered medium with $\chi^{(2)}$ -nonlinearity.* (CT)
Wave propagation and control in complex media - From order to disorder 2021, 28th-30th June 2021, Institut Langevin, Paris, France. (Online)
- *Intensity dependent speckle contrast in a disordered, $\chi^{(2)}$ -nonlinear medium.* (P)
Student Conference on Photonics and Quantum Technology (SCPQT-2021), 24th-26th February 2021, NISER Bhubaneswar, India (Online).
- *Intensity dependent speckle contrast in a nonlinear disordered medium.* (P)
International Conference on Nanoscience and Nanotechnology (ICONN-2021), 1st-3rd February 2021, SRMIST, Chennai, India (Online).
- *Experiment and modeling on photon diffusion inside a disordered, second-order strongly nonlinear medium.* (P)
Workshop on Nonlinear Metamaterials and Photonic Crystals, 9th-12th September 2019, Kfar Blum, Israel.
- *Experiment and modeling on photon diffusion inside a nonlinear disordered medium of finite size.* (P)
Topical Meeting on Advances in Photonics (TMAP-2019), 29th - 30th March 2019, NISER Bhubaneswar, India.
- *Photon diffusion inside a disordered nonlinear medium.* (P)
 - **IONS Manipal 2019**, 11th-14th Jan 2019, MAHE Manipal, India (**Best Poster Award**).
 - **Global Nanophotonics 2018**, 9th-11th Dec 2018, TIFR Mumbai, India.
- *Mesoscopic light transport through a nonlinear scattering medium.* (P)
Contemporary Trends in Optics 2017, 18th-19th Dec 2017, IISER Kolkata, India.

Others:

- *Study and control of light transport in linear and nonlinear complex media.* (CT)
TIFR DNAP annual meeting, 17th-19th April 2023, TIFR Mumbai, India .
- *Study of light transport in $\chi^{(2)}$ - nonlinear complex media: From few particles system to 3D disorder.* (IT)
 - Institut Langevin, PSL University, ESPCI Paris, France, 27th July 2022.
 - Institut Fresnel, Aix Marseille Universite, CNRS, Marseille, France, 25th July 2022.
- *Interference among the neighboring harmonic nanoparticles.* (P)
TIFR DNAP annual meeting, 25th-27th April 2022, TIFR Mumbai, India .
- *Mesoscopic light transport through a nonlinear scattering medium.* (P)
TIFR DNAP annual meeting, 13th-14th Feb 2018, TIFR Mumbai, India .

SCHOOL ATTENDED

2. **2024 Interventional Biophotonics Week:** *Summer School and Symposium*, 22nd-26th July 2024, UC Davis, USA.
1. **Summer School in Optics and Photonics**, 25th-28th July 2018, IISc Bangalore , India.

PROFESSIONAL ACTIVITIES

- Co-founder, former Treasurer & Vice-President of TIFR Mumbai Optica Student Chapter (2020 - 2023).
- **International conference co-organizer:** Student conference on Advances in Optics (SCAO 2021), February 4-5, 2021. [\[Link\]](#)

MEMBERSHIP OF PROFESSIONAL BODIES

- Early Career member, OPTICA.

SCIENTIFIC REVIEWER

- Optica Publishing Group: *Optics Letters*, *Applied Optics*.

LANGUAGES

- English: Full proficiency
- Bengali: Mother-tongue
- Hindi: Full proficiency

REFERENCES

Prof. Sushil Mujumdar (*Doctoral Advisor*)
Department of Nuclear and Atomic Physics,
Tata Institute of Fundamental Research,
1 Homi Bhabha Road, Old Navy Nagar, Colaba,
Mumbai, Maharashtra-400005, India
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