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Sarthak Dash

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Profile

- Researcher specializing in photonics with experience in fiber lasers, nonlinear optics, optical system design and numerical simulations.
- Published 7 articles in top-tier journals in optics with 10+ international conference proceedings.

Experience

Sr. Research Fellow (Apr 2025 - present): Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore, India

Project Associate (Aug 2024 – Mar 2025): Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore, India

Education

PhD (Aug 2018 – Oct 2024)
Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore, India
Thesis: Architectures for linewidth reduction in cascaded Raman fiber lasers and applications
Supervisor: Prof. V.R. Supradeepa

Master of Science in Physics (2015 – 2017)
Department of Physics and Astronomy, National Institute of Technology, Rourkela, India

Research projects

Raman fiber lasers

- Designed various feedback techniques to demonstrate significant linewidth reduction with wavelength tunability in cascaded Raman fiber lasers.
- Demonstrated efficient frequency doubling to generate single-mode, narrow spectrum lasers with 100 mW power from green to red.
- Extending frequency-doubled Raman laser's output range from UV-A to blue region.

Additional research

- Designed and implemented a spectrally tailored source, achieving precise temperature measurement (±1°C) of silicon wafers.
- Built fiber-based pulsed laser systems in NIR and visible for hyperspectral photoacoustic imaging.

Industry collaboration

- Partnered with industry to characterize commercial laser properties and optimize designs.
- Worked with a leading semiconductor instrumentation manufacturer on laser-based temperature monitoring solutions for silicon wafers.

Technical skills

Optical and laser systems:

- Fiber processing: stripping, cleaving, splicing, recoating.
- Design and fabrication of fiber lasers (CW and pulsed), Raman fiber lasers, and amplifiers.
- Free-space optics: pulse shapers, grating filters, beam combiners, collimators, and coupling systems.

Nonlinear optics:

- Expertise in frequency conversion using nonlinear crystals (BBO, LBO, PPLN).
- Simulation of nonlinear pulse propagation and harmonic generation.

Programming and Simulation tools:

- Python, Julia, MATLAB, Mathematica, COMSOL

Teaching and Professional:

- Assisted in teaching of 2 courses in Indian Institute of Science.
- Mentored 4+ graduate students.
- Reviewed 6+ technical papers from top-tier journals in optics.

Achievements

- **SPIE Photonics West "Fiber lasers" Travel Grant** (2024 & 2025)
- **SERB International Travel Support (ITS)** (2024)
- **Best Oral Presentation Award**, 11th CeNSE Student Research Symposium (2024)
- **National-Level Examinations**: GATE (AIR 126, 2018), NET (2017), IIT-JAM (AIR 501, 2015)

Selected publications

Peer-reviewed journals

1. **S. Dash***, R. Deheri*, V. Choudhury, and V. Supradeepa, "Fourier spectral shaper assisted feedback for wavelength and linewidth control of cascaded Raman fiber lasers," Optics Letters 50(1), 201-204 (2025).
2. **S. Dash**, R. Deheri, and V. Supradeepa, "Linewidth reduced cascaded Raman fiber lasers and their harmonic conversion for visible laser sources," Optics Express 32(12), 20629–20637 (2024).
3. R. Deheri, **S. Dash**, V. Supradeepa, and V. Balaswamy, "Cascaded Raman fiber lasers with ultrahigh spectral purity," Optics Letters 47(14), 3499–3502 (2022).
4. A. Goswami*, **S. Dash***, S. Avasthi, and V. Supradeepa, "Contactless temperature measurement of in-process silicon wafer using a spectrally-shaped supercontinuum source," Optics Express, 33(9), 19677-19688 (2025).
5. A. Goswami, S. Padmanavan, **S. Dash**, J. Prakash, and V. Supradeepa, "Pulsed cascaded Raman fiber laser widely tunable in the second near-infrared and visible window for hyperspectral photoacoustic imaging," Optics Letters, 50(7), 2223-2226 (2025).
6. S. Arora, S. Pal, C. Lakshmi, **S. Dash**, V. Supradeepa "Frequency comb-based seed laser architecture with improved Brillouin performance for spectral beam combining of narrow-linewidth lasers," IEEE Photonics Journal, 17 (3), 1-6 (2025).
7. S. Pal, S. Arora, **S. Dash**, C. Lakshmi, V. Supradeepa, "Brillouin-assisted generation and de-multiplexing of widely tunable high-repetition rate 1064 nm optical frequency combs with applications in spectral beam combining," Optics Express 33(10), 21105-21115 (2025).

Selected Conference proceedings

1. **S. Dash**, R. Deheri, and V. R. Supradeepa, “Continuously tunable green to red visible laser sources through harmonic conversion of cascaded Raman fiber lasers,” Proc. SPIE 13342, Fiber Lasers XXII: Technology and Systems, 133420G (2025)
2. A. Goswami, S. Padmanavan, **S. Dash**, J. Prakash, and V. Supradeepa,” Passively Q-switched Raman fiber laser source widely tunable in near infrared and visible window,” Proc. SPIE 13347, Nonlinear Frequency Generation and Conversion: Materials and Devices XXIV, 133470T (2025)
3. A. Goswami, S. Padmanavan, **S. Dash**, J. Prakash, and V. Supradeepa, “Widely tunable Raman fiber laser for hyperspectral photoacoustic imaging,” Proc. SPIE 13319, Photons Plus Ultrasound: Imaging and Sensing 2025, 1331911 (2025).
4. **S. Dash**, R. Deheri, and V. R. Supradeepa, "High power, widely tunable, near-infrared and visible laser sources using Raman fiber lasers," in *2024 Conference on Lasers and Electro-Optics Pacific Rim (CLEO-PR)*, Technical Digest Series (Optica Publishing Group, 2024), paper Mo2H_4.
5. **S. Dash**, R. Deheri, and V. Supradeepa, "Linewidth control of cascaded Raman fiber lasers and visible conversion," Proc. SPIE 12865, Fiber Lasers XXI: Technology and Systems, 128650N (2024).
6. **S. Dash***, A. Goswami*, R. Deheri, S. Avasthi, and V. Supradeepa, "Multi-point thermal monitoring of silicon wafer under processing utilizing a spectrally shaped supercontinuum source," Proc. SPIE 12878, High-Power Laser Materials Processing: Applications, Diagnostics, and Systems XIII, 128780I (2024).
7. A. Goswami, **S. Dash**, R. Deheri, and V. Supradeepa, "Widely tunable visible pulsed cascaded Raman fiber laser source," Proc. SPIE 12869, Nonlinear Frequency Generation and Conversion: Materials and Devices XXIII, 128690H (2024).
8. R. Deheri, **S. Dash**, V. Supradeepa, and V. Balaswamy, “Experimental Investigation on Linewidth Evolution of Cascaded Raman Fiber Laser Pumped with Low Intensity Noise Fiber Amplifiers,” Advances in Photonics Integrated Circuits, LASER and Applications. PHOTONICS 2023.
9. A. Goswami, **S. Dash**, R. Deheri, V. Supradeepa, “Widely Tunable Visible Source Using Pulsed Cascaded Raman Fiber Laser,” Advances in Photonics Integrated Circuits, LASER and Applications. PHOTONICS 2023.
10. S. Arora, **S. Dash**, S. Pal, C. Lakshmi, V. Supradeepa, “Spectral Beam Combining of Narrow-Linewidth Lasers from a Phase Modulated Frequency Comb-Based Seed Source,” Advances in Photonics Integrated Circuits, LASER and Applications. PHOTONICS 2023.
11. R. Deheri, **S. Dash**, V. Supradeepa, and V. Balaswamy, "Cascaded Raman fiber lasers pumped with narrow linewidth, low intensity noise sources," in Conference on Lasers and Electro-Optics/Pacific Rim (Optica Publishing Group, 2022), p. CTuP1D_03.
12. A. Goswami, **S. Dash**, R. Deheri, S. Arun, and V. Supradeepa, "Pulsed cascaded Raman fiber laser with wide wavelength tunability," in Conference on Lasers and Electro-Optics/Pacific Rim (Optica Publishing Group, 2022), p. CTuP1D_02.
13. **S. Dash**, R. Deheri, V. Choudhury, and V. Supradeepa, "Fourier pulse shaper assisted feedback in cascaded Raman lasers for reduced linewidth and wide wavelength tunability Proc. SPIE 11997, Optical Components and Materials XIX, 119970K (2022).
14. R. Deheri, **S. Dash**, V. Supradeepa, and V. Balaswamy, "Cascaded Raman fiber lasers with very high spectral purity and low intensity noise," Proc. SPIE 11981, Fiber Lasers XIX: Technology and Systems, 119810K (2022).

15. **S. Dash***, R. Deheri*, V. Choudhury, and V. Supradeepa, "Tunable random distributed feedback Raman fiber laser with Fourier spectral shaper for feedback control," Proc. SPIE 11665, Fiber Lasers XVIII: Technology and Systems, 116650Q (2021).

*These authors contributed equally