Dr James **Byers**

PHOTONICS ENGINEER -> COMPUTER SCIENTIST

+44 7807 970050 | james.byers92@gmail.com | seamusbarnes.github.io/til | seamusbarnes | james-byers-en

Career Change Statement

I am a photonics engineer transitioning to a second career in software with an emphasis on data science and machine learning. I have extensive experience developing Python codebases collaboratively for quantum and optics control and data analysis, and have suplemented this experience with significant self-study in other areas relevant to software engineering and machine learning (see below).

I bring a strong foundation in problem-solving, analytical thinking, and collaborative development of Python codebases for complex systems, supplemented by self-study in areas such as ML algorithms, data science, and modern software engineering practices.

Skills

Machine Learning	**Python** (**PyTorch**, **scikit-learn**, **XGBoost**, **Optuna**, **NumPy**, **Pandas**, **Matpotlib** etc.), **computer vision** (**CNNs**, **OpenCV**, **fast.ai**), **time-series** modeling and **LLMs** (**transformers**, **auto-encoders**, **embeddings**, **prompt engineering**).
Software Development	**Python**, **Git** (**CI/CD pipelines**, **unit tests**), **REST APIs**, **Javascript**, **HTML**, **CSS**, **Linux**, hardware control (**LabView**, **Artiq**, **PSerial**).
Nanofabrication	**e-beam lithography**, **CVD**, **RIE**, **ICP**, **CMP**, **wafer beonding**, **thin-film deposition**, **chemical etching**, **thermal oxidation**, **ellipsometry**
Languages	**English** (native), **Dutch** (conversational)

Employment

Photonics Development Engineer

Oxford, United Kingdom

OXFORD IONICS

2022 - 2024

- Developed optics setups for characterisation of integrated photonics components for use in a quantum processor unit (QPU).
- Designed, developed and tested Python codebases for quantum experiments and data analysis.
- Implemented data analysis pipelines for quantum experiments, ensuring accurate and reproducible results.
- Designed, built and characterised sub-micron resolution microscopes.
- Characterised integrated photonics devices and collaborated on long-term technology development.

Photonics Engineer

Reading, United Kingdom

FINCHETTO

2022 - 2022

- Designed micro-packaged and integrated optical systems for optical computation.
- Performed optics simulations in MATLAB.
- Rapidly acquired new physics knowledge to guide development.

Postdoctoral Researcher

Enschede, The Netherlands

THE UNIVERSITY OF TWENTE

2021 - 2022

- Developed an EUV imaging spectrometer for EUV lithography.
- Designed micron-scale diffraction lenses.
- Managed the fabrication of diffraction lenses.
- Performed EUV spectroscopy experiments a custom-built spectrometer at the various institutes (ARSM, ARCNL, and the University of Delft).

Senior Research Assistant

Southampton, United Kingdom

THE UNIVERSITY OF SOUTHAMPTON

2019 - 2020

- Developed SiN integrated phtonics in on-chip spectroscopy for biomedical applications.
- Designed and fabricated integrated photonics circuits
- Developed SiN etching recipes
- Fabricatedd photonic crystal waveguide devices for TE-to-TM coupling
- Mentored undergraduate students.

Education

University of Southampton

Southampton, United Kingdom

PHD - OPTOELECTRONIC ENGINEERING

2016 - 2020

PhD Thesis Title: ***Narrow Slot Fully-Crystalline Accumulation Modulator for Low-Power Optoelectronic Interconnection***

University of Leeds — *Leeds, United Kingdom*

MSc - Nanoscale Science and Technology — *2014 - 2015*

MSc Thesis Title: *Simulation of Thermal Transport in Semiconductor Nanostructures*

University of Hull — *Hull, United Kingdom*

BSc - Physics and Philosophy — *2010 - 2013*

Academic Publications

2023 1. Mostafa, Y., Bouza, Z., Byers, J., Babenko, I., Ubachs, W., Versolato, O. O., & Bayraktar, M. (2023). Extreme ultraviolet broadband imaging spectrometer using dispersion-matched zone plates. *Optics letters*, 48(16), 4316-4319

2021 2. Byers, J., Debnath, K., Arimoto, H., Husain, M. K., Sotto, M., Hillier, J., ... & Saito, S. (2021). 10 nm SiO2 TM Slot Mode in Laterally Mismatched Asymmetric Fin-Waveguides. *Frontiers in Physics*, 9, 659585.

2021 3. Bouza, Z., Byers, J., Scheers, J., Schupp, R., Mostafa, Y., Behnke, L., ... & Versolato, O. O. (2021). The spectrum of a 1-µm-wavelength-driven tin microdroplet laser-produced plasma source in the 5.5–265.5 nm wavelength range. *AIP advances*, 11(12).

2021 4. Zhang, W., Debnath, K., Chen, B., Li, K., Liu, S., Ebert, M., ... & Thomson, D. J. (2021). High bandwidth capacitance efficient silicon MOS modulator. *Journal of lightwave technology*, 39(1), 201-207.

2020 5. Saito, S., Tomita, I., Sotto, M., Debnath, K., Byers, J., Al-Attili, A. Z., ... & Rutt, H. N. (2020). Si photonic waveguides with broken symmetries: Applications from modulators to quantum simulations. *Japanese Journal of Applied Physics*, 59(SO), SO0801.

2018 6. Debnath, K., Thomson, D. J., Zhang, W., Khokhar, A. Z., Littlejohns, C., Byers, J., ... & Saito, S. (2018). All-silicon carrier accumulation modulator based on a lateral metal-oxide-semiconductor capacitor. *Photonics Research*, 6(5), 373-379.

2018 7. Byers, J., Debnath, K., Arimoto, H., Husain, M. K., Sotto, M., Li, Z., ... & Saito, S. (2018). Silicon slot fin waveguide on bonded double-SOI for a low-power accumulation modulator fabricated by an anisotropic wet etching technique. *Optics Express*, 26(25), 33180-33191.

Academic Conferences

2020 8. Thomson, D. J., Zhang, W., Li, K., Debnath, K., Liu, S., Chen, B., ... & Reed, G. T. (2020). Silicon photonics for high data rate applications-INVITED. In EPJ Web of Conferences (Vol. 238, p. 01005). EDP Sciences.

2021 9. Zhang, W., Debnath, K., Chen, B., Husain, M. K., Khokhar, A. Z., Liu, S., ... & Thomson, D. J. (2019, August). High speed silicon capacitor modulators for TM polarisation. In 2019 IEEE 16th International Conference on Group IV Photonics (GFP) (pp. 1-2). IEEE.

2021 10. Saito, S., Sotto, M., Debnath, K., Byers, J., Al-Attili, A. Z., Tomita, I., ... & Rutt, H. N. (2019, November). Novel Si Photonic Waveguides and Applications to Optical Modulators. In 2019 24th Microoptics Conference (MOC) (pp. 66-67). IEEE.

2021 11. Byers, J., Debnath, K., Arimoto, H., Husain, M. K., Sotto, M., Li, Z., ... & Saito, S. (2018, August). 3D Fin Waveguide on 10nm Gate Oxide Bonded Double-SOI for Low VπL Accumulation Modulator. In 2018 IEEE 15th International Conference on Group IV Photonics (GFP) (pp. 1-2). IEEE.

2021 12. Debnath, K., Thomson, D. J., Zhang, W., Khokhar, A. Z., Littlejohns, C., Byers, J., ... & Saito, S. (2018, May). 20Gbps silicon lateral MOS-Capacitor electro-optic modulator. In CLEO: Science and Innovations (pp. SM3B-5). Optica Publishing Group.

2021 13. Tomita, I., Debnath, K., Ibukuro, K., Husain, M. K., Byers, J., Zhang, Z., & Saito, S. (2018, August). LiNbO 3/Si-Hybrid Slot-Waveguide Electro-Optic Modulators. In 2018 IEEE 15th International Conference on Group IV Photonics (GFP) (pp. 1-2). IEEE.

2021 14. Thomson, D. J., Debnath, K., Zhang, W., Li, K., Liu, S., Meng, F., ... & Reed, G. T. (2018, July). Towards high speed and low power silicon photonic data links. In 2018 20th International Conference on Transparent Optical Networks (ICTON) (pp. 1-4). IEEE.