

This is an example personal statement written by a student who was accepted and enrolled in the MIT EECS PhD program.

Briefly introduce your research interests and background

My research interest lies in quantum information science and technologies, especially quantum information processing. Building on a strong background from my undergraduate research in this field and the related field of photonics, I am applying to MIT's PhD in EECS to conduct research with the top experts in this field.

For each experience, clearly describe your research problems, specific contributions and quantifiable outcomes to demonstrate your skills

Research in Photonics. My interest began with studying light at the nanoscale. In the summer of my first year, I started as a research assistant to Prof. XXX in University of Toronto's XXXX Group and the spin-off XXX Inc. I developed expertise in modelling, optimization, and fabrication of photonic nanomaterials and devices, especially light-matter interactions involving plasmons – quanta of electron oscillations in metal. I thrived in the research environment and received another XXX fellowship to continue my research with the group part-time during the school year. During my second year, after half a year in the group, I presented my modelling and optimization work as a research poster at the 8th Symposium on Functional Coatings and Surface Engineering. Over the next year, with my maturing knowledge in photonics, I co-authored a device patent and a journal article on photocatalysis. Furthermore, with the trust and support of the group, I self-initiated a study that led to the surprising discovery of localized surface plasmon resonance in optical films from interface diffusion. Working independently during my third school year, I formulated a theoretical model that accounted for the observed optical phenomenon and I made critical predictions about the necessary material morphology that were subsequently validated by additional experiments with Dr. XXX. After months of exacting revisions for scientific rigour as well as clarity and brevity of writing, the year-long effort culminated in my first-author manuscript that is currently (as of Dec. 2018) in review at Nature Photonics.

Clearly demonstrate your enthusiasm and commitment to the research topics you are going for in the targeted program

Research in Quantum Information. The two years of experience in modelling nanoscale light-matter interactions led me naturally to the booming field of quantum information processing. I was fascinated by the potentials of a powerful quantum computer built from light-matter interactions between microwave photons and superconducting circuits. So in the summer of my third year, I shifted focus and joined Prof. XXX's XXX group at Université de Sherbrooke. With an Institut Quantique Fellowship, I undertook a new project on improving the resonance-induced phase gate with our experimental collaborators at the Engineering Quantum Systems group at MIT. It was an extremely enriching experience to join a starting project and be able to develop the full spectrum of skills in designing superconducting circuits, making and validating approximations, modelling interactions, and optimizing device parameters. By the end of the summer, I was fluent in basic Quantum Electrodynamics, the various phase space methods, analytics with Mathematica, and numerics with QuTiP. Armed with these research tools,

List professors that
you are interested
in and clearly explain
the reasons

Address question
about the long-term
professional goal

I dedicated my senior undergraduate thesis to developing a new scheme for non-adiabatic holonomic gates with transmons, with experimental collaborators at ETH Zürich and continued supervision from Prof. XXX.

MIT is a top destination for my graduate research because of its strong expertise in quantum information processing. I have experienced the proficiency of the researchers here first-hand when collaborating with Prof. William Oliver and the Engineering Quantum Systems group. In addition, the classic textbook Quantum Computation and Quantum Information by Prof. Isaac Chuang was the most useful reference throughout my undergrad research in the field. Overall, My research interests aligns very well with that of Prof. Oliver, Prof. Chuang, and Prof. O'Brien.

I am determined to pursue a research career in quantum information processing, with the goal of applying for permanent positions in academic or industrial labs. This is a truly exciting time for the field, as increasing government and industrial investments are expected to accelerate breakthroughs. If I am given this extraordinary opportunity, I hope to leverage the expertise and resources at MIT to contribute to world-class research and successfully launch my own research career.

Finally, for the committee and faculty: Thank you very much for your time and consideration, I look forward to hearing from you soon.

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