

## Antonio Guilherme Ferreira Viggiano — Personal Statement

Being an engineer by training and a programmer by profession, I now aspire to be a mathematician and physicist, seeking to leave a mark on the world through the development of science. My desire to change society goes back to when I applied for Mechatronics Engineering at the University of São Paulo, in Brazil, hoping to invent something that could impact many people's lives. During my double degree in France, I followed a General Engineering program at the École Centrale Marseille, where I took many abstract lectures containing more rigorous mathematical studies of physical systems. From the collision of these two education systems, I started to develop a deeper interest in theoretical subjects over practical ones, which would follow me until this day.

Oxford's Mathematical and Theoretical Physics master's degree is therefore an ideal choice to expand my long-standing interest in natural philosophy and to prepare me for research in the field. Because of my general knowledge of quantum electrodynamics and Feynman diagrams, acquired from Richard Feynman's popular science writing "QED: The Strange Theory of Light and Matter", I am particularly excited about the courses on Quantum Field Theory. I find this area appealing not only because of my solid Quantum Mechanics background from the French curriculum, but also because of my self-study of advanced topics such as multiple-particle systems from Leon van Dommelen's "Quantum Mechanics for Engineers" textbook. Together with my familiarity with Complex Analysis' path integrals and other mathematical tools, I believe I will be able to succeed in these courses. I am also curious about General Relativity, as I think this will be an exciting follow up on Special Relativity and Continuum Mechanics that I have had in my exchange program. I expect my understanding of Tensor Calculus and Electromagnetism to be fundamental to this subject, since the course seems to combine all these disciplines in a coherent manner.

After returning to Brazil, having to choose between my passion for applied mathematics and my aptitude for programming, I joined a technology startup as a software engineering intern. Because of my outstanding performance, I was invited by the chief executive officer to co-found a big data company. Beyond the implementation of traditional algorithms and data structures, we also reviewed many open source projects and research papers, which culminated in the development of an innovative architecture, as well as in our own data storage format and messaging protocol, among other original solutions. The great adoption of the database rapidly incurred in a large number of customer demands, at a time when I spent over two months working more than twelve hours a day non-stop, including weekends and holidays. This dedication was essential for the success of the business and it demonstrates that I can face any amount of stress or work to fulfill my objectives.

Throughout my career in software development, I never ceased to deepen my knowledge of academic disciplines. Wanting to learn in more detail the theory behind quantum computers, I have recently read through the "Quantum Computation and Quantum Information Theory" lecture notes from the Carnegie Mellon University. The description of quantum circuits using their matrix representations on Hilbert spaces, constantly confronted with their classical counterparts, is exhilarating to those interested in intersection of computer science, physics and mathematics. This constant search for the understanding of theoretical subjects led me to question if my career path was indeed aligned with my life objectives.

Despite my accomplishments as an entrepreneur, having helped to establish a million-dollar company with more than a dozen employees, I have decided to leave my position as technical lead of the organization in order to pursue a career in science. Over time, I have realized that even though it is possible to change the world in the private sector, the impact of one's actions are generally not as permanent as when they are applied to our perception of the universe. Even the most successful companies in history vanish when compared to the immortality of the discoveries of Isaac Newton or Albert Einstein, who have not only provided us with a greater understanding of physics but who have also developed whole new fields of mathematics on the way to their findings.

My desire to become part of this select group is what motivates me to join the Mathematical and Theoretical Physics master's degree. Since I wish to get a broader comprehension of nature, I intend to choose the Generalist Theoretical Physicist pathway of the curriculum. After completing the course, I intend to apply for a Ph.D. programme at the University of Oxford or another top-tier institute and continue to follow my ambition of influencing future generations as a researcher in mathematics and physics.