

Dear Sir/Madam,

I am a physics student of the University of the Basque Country and with this motivation letter I want to express my strong will of pursuing the master program in *Quantum Science and Technology*. I am now in the last year of my degree and very interested in continuing my academic pursuits.

In physics, both experimental and theoretical work interest me. I would like to progress in both fields, and I think this master is a great opportunity to do so. I found out about this new master via a friend of mine, and what initially brought my attention was the inter-university and inter-institutional aspect of the master. I think it is a great opportunity to get to know the quantum science research community in Barcelona, and to start my career path as a researcher.

Ever since I started my degree I have been interested in research, and my will is to pursue a PhD after the master. This year I gladly joined the *Basque Center of Materials* for a 3-month internship that lasts until May. In this internship I am learning the basics of material characterization and the manipulation of the most used equipment for that purpose. This includes using a VSM (*Vibrating sample magnetometer*) to study hysteresis-loops and the utilization of a SEM microscope for morphological analysis of powder samples, for example. The internship is also allowing me to see how a research centre works, and spending time surrounded by curious and motivated people inspires me to follow the same path as my colleagues.

Alongside my internship, I am doing a purely theoretical end-of-degree project. The project consists of using tight-binding models to study the band structure of some simple low-dimensional systems from a topological perspective. This involves carrying out simulations on Python. For example, I have studied the different topological phases in Haldane's model, a 2D hexagonal lattice (graphene) where time-reversal symmetry is broken due to a magnetic field.

My biggest interest in physics has always been quantum mechanics, and the new phenomenon that can be predicted from it. This year, my end-of-degree project has sparked my interest in the cross between quantum mechanics and condensed matter physics, especially in topological insulators and topological phases of matter. It would be a pleasure for me to do something experimental related to these subjects as my thesis, because I would genuinely enjoy seeing the ideas I have been studying actually happening in real life.

My preference is to do the thesis in ICFO or ICN2. I have gone through the websites to see the different research groups, and it is not easy to say where exactly I would like to do it, because I would be more than happy to join any group in these centres.

I hope that the information I gave in this letter is helpful. Thank you very much for your time and for the opportunity.

Sincerely,

Mireia Tena