

Dear Members of the Selection Committee,

This letter is to support **Javier Rozalen's** application for the **Master in Quantum Science and Technology**, coordinated by the University of Barcelona. In the following, I aim to justify why he is an **outstanding** candidate for this Master's programme.

I have over 15 years of academic experience in Spain, the US (Michigan State University) and the UK (Surrey, from 2009 to 2020), including 3 individual Research Fellowships (Marie Curie, STFC Advanced Fellowship and now Ramón y Cajal). I have taught at all levels in Physics bachelor's and master's degrees, and I have supervised 13 bachelor and 5 master thesis students at Surrey, as well as 5 PhD students. I will also teach the *Advanced Quantum Mechanics* module in the Master in Quantum Science and Technology in fall 2021 - so I think I am well placed to judge Javier's potential in this Master's.

I started working with Javier shortly after my arrival at Barcelona (in Sep 2020), as the supervisor of his Final Undergraduate Project. Javier's project looks at solving a nuclear quantum mechanical problem using off-the-shelf machine learning techniques – following a recent paper of mine ([Phys. Lett. B 809, 135743 \(2020\)](#)). 6 weeks into the project, Javier has essentially managed to **reproduce this research-level paper** with very little input on my side. This is a feat of its own - for comparison, it took James Keeble (the PhD student that lead the paper) around 6 months to get to the same point.

To me, this signals a very good level of **independence** and **maturity** – particularly because Javier has had no input at a detailed computational level. Javier has shown **initiative** throughout, solving problems as they arose and bringing in relevant discussion points to our weekly meetings. I am particularly impressed with his **computational skills**: his code is written on Pytorch (a machine-learning platform that is not particularly user friendly) and is available in GitHub. This shows a clear commitment towards **open coding** practices, something rather uncommon at such an early stage. I note also that Javier is also a very good **communicator**, and has had no trouble at all expressing complex conceptual ideas across.

A competitive environment in theoretical physics will take out the best of him. He certainly has the physics background, the analytical skills, the critical thinking abilities and the independent work analysis that are needed for such an endeavour. I note that his academic track may not be the best proxy for these active learning qualities, which are however key at a master's and PhD level. Let me also stress that he is extremely motivated by the possibility of joining the second quantum revolution via this master's.

Please do not hesitate to contact me if you need any further information.

With best regards,

A handwritten signature in blue ink, appearing to be 'ARH', written in a fluid, cursive style.

Dr Arnau Rios Huguet, 12 April 2021