(BL102/2026-IST-ID)

Research Studentships (for students of a course that does not award an academic degree)

Applications are open for one Research Studentship, within the framework of the project "Scalable Quantum Liouvillian Tomography" (SCALE-QLT), reference 2024.16192.PEX, financed by national funds through FCT/MCTES (PIDDAC), under the following conditions:

Scientific Area: Physics / Physical Sciences / Condensed Matter Physics

Admission Requirements:

a) To hold a Master degree in Physics, Engineering Physics, Quantum Technologies, Computer Science, Applied Mathematics, or a related area, and to be enrolled at a course that does not award an academic degree, integrated in the educational project of a higher education institution and developed in association or cooperation with one or more R&D units;

b) Not to exceed, with this contract including possible renewals, an accumulated period of two years in this type of studentship, continuously or with interruptions;

c) Previous experience in quantum dynamics, open quantum systems, quantum information, scientific programming, numerical optimization, and/or machine-learning methods will be valued.

Workplan: The work will be carried out in the context of the SCALE-QLT project and will focus on efficient few-qubit quantum process tomography and Liouvillian reconstruction. The selected candidate will develop a computational framework to simulate tomography experiments and reconstruct noisy quantum processes from measurement data. The work will include: (i) simulation of Pauli-string tomography measurements for few-qubit systems; (ii) implementation of parameterizations of completely positive trace-preserving maps, including Kraus-operator or related constrained representations; (iii) development and testing of gradient-based optimization routines, using automatic differentiation/backpropagation, for quantum map or generator reconstruction; (iv) analysis of reconstruction accuracy under realistic constraints such as finite sampling, shot noise, and limited measurement resources; and (v) benchmarking of different measurement strategies, including optimized Pauli-string sets and, if time permits, SIC-based probe states. The expected outputs are documented Python code, numerical benchmarks, documentation/example scripts, and a short technical report. The work is relevant for the student's advanced training in computational quantum physics, open quantum systems, quantum information, and machine-learning-assisted numerical methods.

Legislation and Regulations: Statute of Scientific Research Fellow, approved by Law nr. 40/2004, of August 18, as worded by Decree-Law nr. 123/2019, of August 28; FCT Regulation for Research Studentships and Fellowships, available on https://dre.pt/application/file/a/127230968 .

Workplace: The work will be developed at CeFEMA - Center of Physics and Engineering of Advanced Materials, Instituto Superior Técnico / Associação do Instituto Superior Técnico para a Investigação e o Desenvolvimento (IST-ID), under the scientific supervision of Professor Pedro Ribeiro.

Duration: The research fellowship will have the duration of 6 months. It is expected to begin as soon as possible, and may be renewed up to the maximum of 6 months, including the duration of the initial contract, subject to the availability of funds and the project duration.

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Monthly maintenance allowance: According to the values for Research Fellowships awarded by FCT in Portugal https://www.fct.pt/fct-atualizou-o-valor-das-bolsas-para-2026/, the amount of the monthly maintenance allowance is €1359,64 being the payment method an option of the Fellow by Wire Transfer/Check.

Selection methods: The selection methods to be used will be the following: curricular assessment and previous experience, with the respective valuation of 60 and 40 out of a total of 100 values. The evaluation will consider the adequacy of the candidate's academic background and CV to the work plan, with particular emphasis on previous experience in quantum dynamics, scientific programming, and machine-learning methods. If deemed necessary by the jury, the best-ranked candidates may be invited for an interview to clarify elements of the CV; in that case, the interview will not have an autonomous weighting and will only serve to support the curriculum evaluation.

Composition of the selection Jury: Professor Pedro Sacramento; Professor Pedro Ribeiro; Professor Giuseppe De Tomasi.

Announcement/ notification of the results: The final evaluation results will be communicated to all applicants by email.

Deadlines and procedures of complaint and appeal. A complaint may be lodged from the final decision within 15 working days, or an appeal to the Executive Board of IST-ID within 30 working days, both counted from the respective notification

Application deadline and formalization: The call is open from June 12 until June 25, 2026.

It is mandatory to formalize applications with the submission of the following documents: i) B1 Form – Fellowship application (https://ist-id.pt/recursos-humanos/bolseiros/#documentos-relacionados); ii) *Curriculum Vitae*; iii) academic degree certificate, where applicable; iv) proof of enrollment at a course that does not award an academic degree; v) motivation letter; vi) declaration on honor that the applicant does not exceed with this contract an accumulated period of two years in this type of studentship, continuously or with interruptions.

Applications must be submitted to the email: ribeiro.pedro@tecnico.ulisboa.pt