

PhD fellow in Single-cell spatial genomics analysis and modelling tools

IIT invites excellent candidates to apply to its PhD program organized in collaboration with the Open University; this international PhD program confers Doctorates in *Health, Sustainable and Human Technologies*.

In order to be admitted into the ARC program, the minimum requirements are

- i. a Masters-level degree, which broadly corresponds to a 4/5-year undergraduate MSc/MChem/Meng-style degree or to a postgraduate Masters in the British system, or to a second level University degree in Italy;
- ii. a grade corresponding to an upper second class (2.1) or a merit in the UK system or 100/110 in the Italian system. Candidates with lower grades but redeeming features (publications, specific expertise) are requested to contact the potential supervisors before applying;
- iii. where English is not the applicant's first language, a valid IELTS (International English Language Testing System) certificate. The minimum acceptable score is an overall 6.5, with no less than 6.0 in any of the four categories

One PhD fellow position **will be available from October 1st 2022** in the Integrative Nuclear Architecture Research Line, led by its Principal Investigator, Irene Farabella.

Title of the project: Genome structural plasticity: tools for single-cell spatial genomics analysis and quantification

Background: Spatial genomics techniques (Bintu, Mateo et al. 2018, Nir, Farabella et al. 2018, Szabo, Jost et al. 2018, Finn, Pegoraro et al. 2019, Su, Zheng et al. 2020, Takei, Yun et al. 2020) enable the direct visualisation of multiple genomic loci in the nuclear space allowing the investigation of the properties of the chromatin fiber over a range of length-scales (ranging from kilobases to multiple megabases in length) one cell at the time. However, in addition to the direct visualisation of the 3D genome at varied scale and resolutions, there is a need for standardised quantitative ad-hoc analysis methods and for method to integrate spatial genomics data with others genomics information to shed light on the relationship between genome structural plasticity and genome function.

Description: We are looking for a motivated PhD student with an enthusiasm to develop and implement tools to investigate the single-cell genome structure at nanoscale. Our research uses hybrid method (computational and experimental) integrating imaging techniques, as seq-OligoSTORM(Nir, Farabella et al. 2018), genomic data, structural bioinformatics, and physical theories for determining the 3D structures of genome that will contribute to a more complete characterization of genome regulatory circuits. The successful candidate will be involved in the design, development and implementation of computational tools for spatial genomic analysis and modelling. The candidate will interact and collaborate closely with other researchers in the Farabella Lab as well as with members of the other research groups within the CHT.

References:

- Bintu et al., *Science* (2018) 362(6413).
Finn et al., *Cell* (2019) 176(6): 1502-1515 e1510.
Nir, G., I. Farabella, C. Perez Estrada, C. G. Ebeling, et al., *PLoS Genet* (2018) 14(12): e1007872.
Su et al., *Cell* (2020) 182(6): 1641-1659.e1626.
Szabo et al., *Sci Adv* (2018) 4(2): eaar8082.
Takei et al., *Nature* (2020) 590(7845): 344–350.

Main Supervisor: Irene Farabella (Integrative Nuclear Architecture)

Essential expertise:

- i. Genetics/biology/bioinformatics/theoretical physics background or closely related fields
- ii. Good proficiency in Python
- iii. Familiarity with 3D biomolecules
- iv. Proficiency with Unix/Linux operating system

Desirable expertise:

- i. Familiarity with imaging technologies, processing and analysis
- ii. Familiarity with genomic data.
- iii. Familiarity in machine learning, statistics, optimization.
- iv. Familiarity with molecular modelling tools

How to apply. Prospective students must submit, [using the online form](#), the following documents

- 1) 2-page CV, which includes studies, expertise and achievements.
- 2) 1-page research statement, which includes the choice of a project from the list above and a justification of the choice. Only if robustly justified, the student may signal their interest also for a second project, but there is no guarantee that this will be taken into account by the selection panel.
- 3) A transcript of undergraduate and postgraduate studies.
- 4) A valid IELTS certificate, obtained no more than two years before the proposed registration date.
- 5) Contact details of two referees.

For this position, ARC accepts candidatures on an ongoing basis (first-come, first-served).

Istituto Italiano di Tecnologia, with its headquarters in Genoa, Italy, is a non-profit institution with the primary goal of creating and disseminating scientific knowledge and strengthening Italy's technological competitiveness. IIT's research endeavour focuses on high-tech and innovation, representing the forefront of technology with possible application from medicine to industry, computer science, robotics, life sciences and nanobiotechnologies.

Istituto Italiano di Tecnologia is an Equal Opportunity Employer that actively seeks diversity in the workforce.

Please note that the data that you provide will be used exclusively for the purpose of professional profiles' evaluation and selection, and in order to meet the requirements of Istituto Italiano di Tecnologia. Your data will be processed by Istituto Italiano di Tecnologia, based in Genoa, Via Morego 30, acting as Data Controller, in compliance with the rules on protection of personal data, including those related to data security.