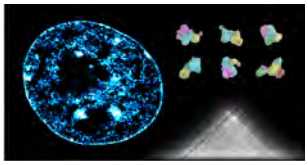
INSTITUT DE GENETIQUE HUMAINE
Centre National de la Recherche Scientifique UMR9002



Engineer (IE) position in Computational Genomics on Epigenetic Regulation and Cancer Biology

An engineer position in computational biology is available from February 2025 to study the relation between regulation of gene expression, 3D genome organization and epigenetic modification during cell differentiation and cancer biology in the lab of Giacomo Cavalli.

Our lab has demonstrated that epigenetic modifications can lead to inheritance independent on the DNA sequence. This can be observed in mammalian cells, during *Drosophila* development and in multiple subsequent generations. In the model system *Drosophila melanogaster*, transient perturbation of epigenetic components can induce cancer independently of genetic mutations. Our goal is now to define the molecular mechanisms leading to epigenetic inheritance in mammalian systems and in *Drosophila*. To achieve this objective, we use a variety of complementary approaches and techniques in molecular and cellular biology, genomics and bioinformatics. The engineer will be responsible for implementing pipelines for the analysis of NGS data, including RNA-seq, ChIP-seq, Cut & Run, Hi-C and micro-C ranging from raw data to basic analyses. The work will be performed under the supervision of a permanent researcher (Chargé de Recherche) with expertise in bioinformatics and computer science in Giacomo Cavalli's team at the Institute of Human Genetics. IGH is a flagship institute for life science research and is located in the vibrant city of Montpellier, in the southern French riviera. It offers state of the art equipments and facilities in a top-notch international environment.

An initial experience of the Linux operating system, basic Bash scripts and R or Python scripts are required. Knowledge of NGS data analysis and workflow systems (Nextflow, Snakemake,…etc) is highly appreciated.

Application procedure

1) please apply directly through the website https://emploi.cnrs.fr/Gestion/Offre/Default.aspx?Ref=UMR9002-LAUFRI-001
2) in addition, please email your CV, a statement of research interests could be sent directly to the addresses below. Firthermore, please arrange for two recommendation letters to be sent directly by your previous and current mentors to the same addresses:
giacomo.cavalli@igh.cnrs.fr and lauriane.fritsch@igh.cnrs.fr.

> For more information, see website:
https://www.igh.cnrs.fr/en/research/departments/genome-dynamics/chromatin-and-cell-biology

Recent selected papers from the lab

1) Parreno V, Loubiere V, Schuettengruber B, Fritsch L, Rawal CC, Erokhin M, Győrffy B, Normanno D, Di Stefano M, Moreaux J, Butova NL, Chiolo I, Chetverina D, Martinez AM, **Cavalli G** (2024) Transient loss of polycomb components induces an epigenetic cancer fate. **Nature** PMID 38658752
2) Fitz-James, M.H., Sabaris, G., Sarkies, P., Bantignies, F. & **Cavalli, G.** Interchromosomal contacts between regulatory regions trigger stable transgenerational epigenetic inheritance in Drosophila. **Molecular Cell in press** (2024).
3) Paldi, F., Szalay, M. F., Di Stefano, M., Jost, D., Reboul., H., and **Cavalli, G.** Transient histone deacetylase inhibition induces cellular memory of gene expression and three-dimensional genome folding. **bioRxiv** (2024). https://doi.org/10.1101/2024.11.21.624660
4) Alaterre, E., Ovejero, S., Bret, B., Dutrieux, L., Sika, D., Fernandez Perez, R., Espeli, M., Fest, T., Cogne, M., Martien-Subero, J. I.,
5) Milpied, P., **Cavalli, G**., and Moreaux, J. Integrative single-cell chromatin and transcriptome analysis of human plasma cell differentiation. **Blood** (2024).
6) Parreno V, Martinez AM, **Cavalli G** (2022) Mechanisms of polycomb group protein function in cancer. Cell Research PMID 35046519
7) IJerkovic, I. and **Cavalli**, G. (2021) Understanding 3D genome organization by multidisciplinary methods. **Nature Reviews molecular cell Biology**, doi: 10.1038/s41580-021-00362-w.
8) Szabo, Q. Donjon, A., Jerkovic., I., Papadopoulos, G.L., Cheutin, T., Bonev, B., Nora, E., Bruneau, B. G., Bantignies, F., and **Cavalli, G.** Regulation of single-cell genome organization into TADs and chromatin nanodomains. **Nature Genetics 52**, 1151-1157 (2020).
9) Schuettengruber, B., Bourbon, H., Di Croce, L., and **Cavalli, G**. (2017). Genome Regulation by Polycomb and Trithorax: 70 years and counting. **Cell** 171, 34-57
10) Loubiere, V., Delest, A., Thoma, A., Bonev, B., Schuettengruber, B., Sati, S., Martinez, AM., and **Cavalli, G**. (**2016**). Coordinate redeployment of PRC1 proteins suppresses tumor formation during Drosophila development. **Nature Genetics** 48, 1436-1442, doi:10.1038/ng.3671.

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