



University of Genova

Department of Earth, Environmental  
and Life Sciences

Doctorate Course in Earth and  
Environmental Science and  
Technology

Università degli Studi di Genova



Dottorato in Scienze e Tecnologie  
per l'Ambiente e il Territorio

## Curriculum in biology applied to agriculture and the environment

Research Theme n. 6

**Titolo (Italiano)**

Microscopia Ottica Multimodale per lo studio dell'organizzazione della cromatina durante il differenziamento cellulare e la trasformazione neoplastica

**Title (inglese)**

Multimodal Optical Nanoscopy to study chromatin organization during cell differentiation and neoplastic transformation.

**Tutor (name and email) and eventual co-tutor**

Laura Vergani (DISTAV)

Albero Diaspro e Francesca Baldini (IIT)

**Program description including the formation program abroad (Inglese)**

Chromatin organization and nuclear architecture has an important role in genome physiology and in the onset of many genome-related diseases. Today we can follow chromatin organization at the molecular level, taking advantage of a multimodal optical approach as the one provided by super-resolved optical fluorescence microscopy coupled with label-free CIDS (circular intensity differential scattering signature). Several unanswered questions in biomedical research are connected to the role of chromatin nanoscale architecture. The project focuses on investigating the possible changes in chromatin organization and nuclear architecture at nanoscale level in two models of (i) malignant transformation and (ii) adipogenic differentiation. Alterations of chromatin nanoscale structure will be observed in the whole nucleus and in specific chromosome territories/genes being associated to differentiation/transformation, shedding light on its role during cell differentiation and malignant transformation. The research will integrate multimodal optical data towards the outcome of unveiling whether NB-associated chromatin alteration locates in correspondence of specific territories or genes and paving the way towards new prognostic and therapeutic approaches.

Financial support : IIT, PRIN

Tutor's publications (max 3)

- Baldini F, Fabbri R, Eberhagen C, Voci A, Portincasa P, Zischka H and Vergani L "Adipocyte hypertrophy parallels alterations of mitochondrial status in a cell model for adipose tissue dysfunction in obesity" *Life Sciences* 2020 265 (2021) 118812 (DOI: 10.1016/j.lfs.2020.118812)
- Baldini F, Calderoni M, Vergani L, Modesto P, Florio T and Pagano A. "An Overview of Long Non-Coding (lnc)RNAs in Neuroblastoma" in *International Journal of Molecular Sciences* 2021 22(8), 4234 (DOI: 10.3390/ijms22084234)
- Le Gratiet, A.; Marongiu, R.; Diaspro, A. Circular Intensity Differential Scattering for Label-Free Chromatin Characterization: A Review for Optical Microscopy. *Polymers* 2020, 12, 2428. <https://doi.org/10.3390/polym12102428>