European School of Molecular Medicine

2025 summer call PhD selections

AVAILABLE POSITIONS

Principal Investigator	**Beatrice Zitti**
Affiliation	IFOM ETS - The AIRC Institute of Molecular Oncology
Title of the proposed project:	Leveraging advanced CRISPR/Cas9 screening technologies to investigate tumor response to treatment and its crosstalk with the tumor microenvironment
Short description of the project	Increasing evidence demonstrates the crucial role of the tumor microenvironment (TME), including the spatial arrangement and functional state of immune infiltrates, in governing tumor progression and therapeutic outcome. Traditional pooled CRISPR/Cas9 screens have been widely used to uncover cell-intrinsic regulators of proliferation or survival, but they are poorly suited to probe genes that control cell-extrinsic features, such as tissue architecture, extracellular signaling, and immune crosstalk. The successful candidate will employ spatially resolved CRISPR/Cas9 functional genomics screens to systematically map how gene disruptions influence tumor growth, histopathology, and the composition of immune infiltrates in response to chemotherapy and/or immunotherapy. By combining pooled library delivery with high-plex imaging, and single-cell spatial transcriptomics, we will read out knockout effects in situ. Elucidating these intercellular networks will pave the way for novel strategies to remodel the TME, overcoming intratumoral heterogeneity and improving patient response to cancer therapy. By joining a multidisciplinary team with deep expertise in functional genomics and tumor immunology, the successful candidate will help redefine how spatial biology informs cancer treatment.
Main research area for the project	Cancer Biology
Second research area for the project	Immunology
3 key words for project	Tumor microenvironment; spatial CRISPR/Cas9 screen
Main topic/s of the lab	Tumor microenvironment and immunotherapy
Short description of the lab activity	The research activity of the lab focuses on understanding how spatial and functional interactions among immune cells within tissues influence anti-tumor immunity, with the goal of identifying novel strategies to improve immunotherapeutic outcomes. Specifically, we use patient derived samples and mouse tumor models, integrating high-dimensional spectral flow cytometry, spatial analyses, single-cell transcriptomics and intravital imaging to dissect the cellular and molecular mechanisms that orchestrate effective immune responses within the tumor microenvironment. The project will be in close collaboration with the Functional Genomics Unit, leveraging their expertise in cutting-edge CRISPR/Cas9 screening technologies.

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Recent bibliography	Bill R, Wirapati P, Messemaker M, Roh W, **Zitti B**, Duval F, Kiss M, Park JC, Saal TM, Hoelzl J, Tarussio D, Benedetti F, Tissot S, Varrone M, Ciriello G, McKee TA, Monnier Y, Mermod M, Blaum EM, Gushterova I, Gonye ALK, Hacohen N, Getz G, Mempel TR, Klein AM, Weissleder R, Faquin WC, Sadow P, Lin D, Pai SI, Sade-Feldman M, Pittet MJ. *CXCL9:SPP1+ macrophage polarity identifies a network of cellular programs that control human cancers.* ***Science*** (2023) 381(6657):515-524 **Zitti B**, Hoffer H, Zheng W, Pandey RV, Schlums H, Perinetti Casoni G, Fusi I, Nguyen L, Kärner J, Kokkinou E, Carrasco A, Gahm J, Ehrström M, Happaniemi S, Keita AV, Hedin CRH, Mjösberg J, Eidsmo L, Bryceson YT. *Human skin-resident CD8+ T cells require RUNX2 and RUNX3 for induction of cytotoxicity and expression of the integrin CD49a.* ***Immunity*** (2023) 56:1-18 Helm EY, Zelenka T, Cismasiu VB, Islam S, Silvane L, **Zitti B**, Holmes TD, Drashansky T, Kwiatkowski AJ, Tao C, Dean J, Obermayer AN, Chen X, Keselowsky BG, Zhang W, Huo Z, Zhou L, Sheridan B,Conejo-Garcia JR, Shaw TI, Bryceson YT, Avram D. *Bcl11b sustains multipotency and restricts effector programs of intestinal-resident memory CD8+ T cells.* ***Sci Immunol*** (2023) 8(82):eabn0484 Gallais Sérézal I, Hoffer E, Ignatov B, Martini E, **Zitti B**, Ehrström M, Eidsmo L. *A skewed pool of resident T cells triggers psoriasis-associated tissue responses in never-lesional skin from patients with psoriasis.* ***J Allergy Clin Immunol*** (2019) 143(4): 1444-1454
Group composition	Tumor microenvironment and immunotherapy Lab Beatrice Zitti, PhD – Principal Investigator Eleonora Russo, PhD – Postdoctoral Fellow Functional Genomics Unit Giuseppina D'Alessandro, PhD – Functional Genomic Screening Head Mario Cinquanta, PhD – Functional Genomic Screening Coordinator Marisa Aliprandi – Functional Genomic Screening Technician
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