Deciphering muscle self-organization principles with DNA-PAINT super-resolution and deep learning

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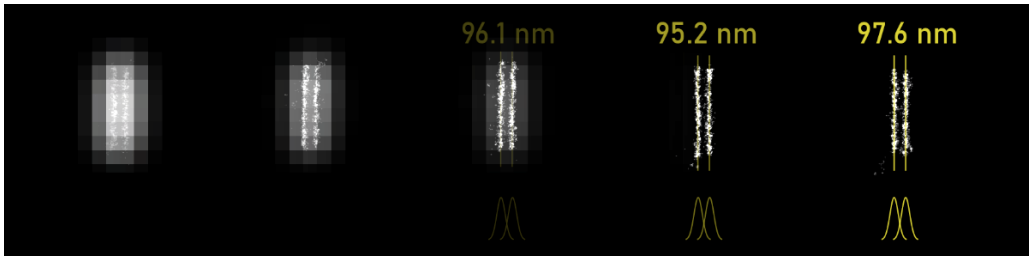
The Schnorrer team is welcoming applications for a **PhD position funded by the ERC synergy grant StuDySarcomere** to decipher how sarcomere components self-organize at the molecular scale to build a functional contractile muscle.



Project

Background: Muscles assemble tens of different proteins into periodic contractile structures called sarcomeres. Although the sarcomere components in the mature sarcomere are known, how these proteins assemble to functional sarcomeric machines is still a mystery. Sarcomeric proteins are large and locate at defined positions of the sarcomere, seen in stripes (see image above). However, with classical imaging techniques, it is nearly impossible to follow how proteins come together at the molecular scale.

Goal: We apply DNA-PAINT super-resolution imaging, together with a novel labelling method using nanobodies, to decipher how sarcomeric components assemble with nearly two-order of magnitude better resolution than classical confocal microscopy. State of the art image analysis, including deep learning methods, will be instrumental to automate analysis of the large data obtained. The *in vivo* model *Drosophila* as well as stem cell derived human muscle fibers will be used in the project.

The team and the environment

This ambitious project will be hosted in a team of biologists and physicists, experts in muscle at the **Developmental Biology Institute of Marseille (IBDM), France**. The PhD student will benefit from state-of-the-art biological tools and instruments, including a high-end DNA-PAINT dedicated microscope of the team. This project will be supported by several team members and will benefit from collaborations through the European ERC Synergy network StuDySarcomere.
The team is part of the very active multidisciplinary program, The Turing Center of Living Systems, Centuri, which brings together biologists, physicists, and computational scientists. The student will benefit from this environment, including collaborations, courses, seminars, and meetings.

Your profile

You are a Physicist with strong interest in Biology or a Biologist with strong background in computational analysis. You are ambitious, enjoy doing experiments and analyze your data with tools you can develop.

Contact

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