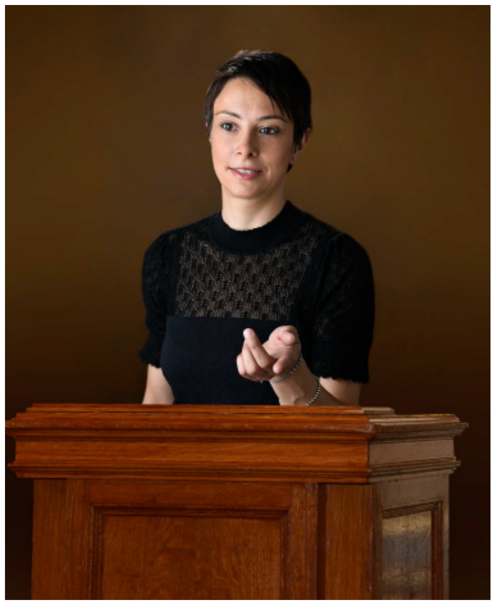
Tamara Bidone Joins the Scientific Computing and Imaging Institute as an Assistant Professor of Biomedical Engineering

Tamara Carla Bidone has joined the University of Utah's Scientific Computing and Imaging (SCI) Institute as assistant professor of bioengineering. The SCI Institute focuses on solving important problems in biomedicine, science, and engineering using computation and is an international research leader in the areas of scientific computing, visualization, and image analysis.

Tamara Bidone joins the SCI Institute from The University of Chicago, where she was a Postdoctoral research fellow in the group of Gregory Voth. Dr. Bidone received training in Computational Biomechanics, Biophysics and Computational Chemistry. In 2011 and 2012 she was the recipient of the prestigious MITOR grant, an MIT fellowship to jump-start collaborative projects in the field of Life Sciences. Dr. Bidone was a visiting scientist at the Mechanobiology Laboratory of MIT, where she worked on a computational micro-mechanical model of cell contraction in collaboration with Roger Kamm. In 2012, Dr. Bidone received the Inter-polytechnic school of Engineering award and joined the Department of Mechanical Engineering of the University of Saragoza to work on a model of cell mechanosensing. In 2013, Dr. Bidone received her PhD in Biomedical Engineering from the Polytechnic University of Turin, Italy, with a thesis about a computational model of cell cytoskeleton mechanics. From 2013 to 2015, Dr. Bidone joined the Department of Physics at Lehigh University as Adjunct Professor of Introduction to Computational Physics and developed a computational model of cytokinetic ring assembly, in collaboration with Dimitris Vavylonis.

In her research, Dr. Bidone develops computational frameworks that help cell biologists and biophysicists understanding what molecular mechanisms underlie complex, emergent properties of cells, such as migration, division and stiffness sensing. Dr. Bidone takes a hypothesis-driven approach, where potential mechanisms from prior information about cell structure and dynamics are implemented



numerically. These mechanisms represent casual relationships between cell components, including molecular motors and various cytoplasmic and membrane proteins, that collectively bring the system to a new, interesting state. Proteins and motors in the simulations evolve in position, relative interactions and generated stresses, and can make a cell dividing into two or an active bundle of proteins forming and transmitting stresses. Such studies have led to new discoveries and insights about how cell change shape, sense surface rigidity and express various proteins.

The field of computational biology have rapidly evolved in the last decades and Dr. Bidone deeply believes that developing numerical approaches to understand cell dynamics is an important component to the future of biology.

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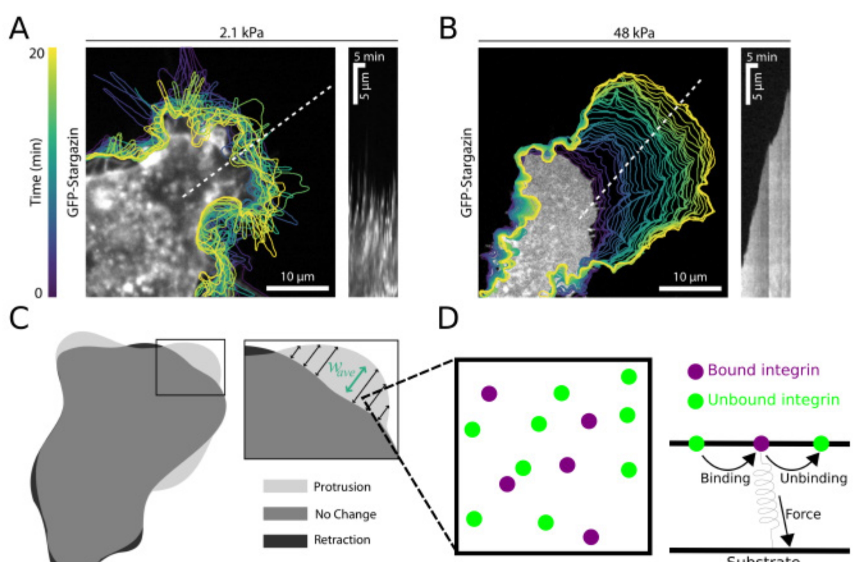

The first step in cell motion is when the cell forms a lamellipodium—meaning "thin sheet foot." With its lamellipodium, the cell reaches out to test a surface, before the cell moves onto it. The amount of extension of the lamellipodium depends on the rigidity of the substrate (panels A-C). A computational model of a virtual lamellipodium was developed by Dr. Bidone and published in PNAS in 2018. Transmembrane integrin receptors were simulated: they sense surface stiffness to allow cell spreading (panel D).