



Dipartimento  
di Fisica  
e Astronomia  
Galileo Galilei

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ANNI



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## **Seminar**

*December 22, 2021 – 15:00*

*Aula A. Rostagni – Dept. of Physics and Astronomy “G. Galilei”*

*Link Zoom: Meeting ID: 868 9981 1440 - Passcode: 985286*

## **Dr. Giovanni Perotto**

*Smart Materials Lab, Italian Institute of Technology (IIT – Genova)*

# **The material science and engineering of proteins for more sustainable technologies**

Proteins are natural macromolecules that nature developed for an extremely wide variety of functions: catalysts, molecular machines, structural elements, storage of energy and even information. In the last few decades, thanks to development of biomedical engineering, proteins have been used as materials, or as bio active components, for tissue engineering, drug delivery and regenerative medicine.

Developing material technologies for the processing and engineering of proteins will be instrumental in enabling them to become new bio-based alternatives in technological applications, as bio-interfaces (leveraging on their nature as biomolecules) and, in a broader context, as alternatives to conventional plastics.

In this talk, I would like to share some of our recent results on the engineering of structural proteins (silk fibroin and wool keratin) for more technological applications, ranging from optics to electronics. We were able to correlate the molecular structure (e.g., crystallinity) with macroscopic properties (e.g., refractive index or degradation rate), we developed fabrication methods to process the proteins in different material formats (nanoparticles, fibers, hydrogels, freestanding films) and we developed nanoparticles-proteins composite materials to improve the functional properties of both nanoparticles and proteins.



*Giovanni Perotto currently works at the Smart Materials Lab of the Italian Institute of Technology (IIT) in Genova, Italy.*

*Giovanni does research in Materials Physics, Materials Science and Experimental Physics. He's leading research projects on the use of proteins for drug delivery and as materials for technology (electronics, magnetics). He's also working on development of bioplastics from sustainable resources like vegetables, textile and protein waste.*