



**Dipartimento  
Meccanica  
Matematica  
Management**

MUR  
Dipartimento  
di Eccellenza  
2018-2022  
2023-2027

## CALL FOR EXPRESSION OF INTEREST FOR MSCA POSTDOCTORAL FELLOWSHIPS AT POLITECNICO DI BARI

### Research project

**Nome and Surname:** Carmine Putignano

**Title:** SBIT-Soft Bio-Interfaces Tribology

**Description:**

This fellowship project proposes a comprehensive study of lubrication phenomena at biological interfaces, grounded in the principles of multiscale bio-tribology. The research will explore the complex interplay between fluids and soft biological solids across multiple length and time scales. From the fluid mechanics perspective, emphasis will be placed on non-Newtonian lubricants, particularly shear-thinning and viscoelastic biofluids such as synovial fluid and mucus, whose rheological properties critically influence interfacial friction and load-bearing capacity. Solid interfaces will be modeled using viscoelastic and hyperelastic constitutive laws to capture the nonlinear, time-dependent behavior of tissues like cartilage, skin, and cellular membranes.

A key focus will be the role of surface roughness, characterized across several orders of magnitude, and its impact on lubrication regimes—from boundary to hydrodynamic. The multiscale modeling framework will integrate numerical simulations, analytical methods, and potentially experimental validation, tailored to the fellow's profile and expertise. Applications will cover a wide biomedical spectrum, including articular cartilage contact, dermal friction in wearable technology, and cellular/tissue-level mechanics relevant to diagnostics and therapeutics.

Hosted by a leading research group with over 20 years of experience and international recognition in tribology—including Marie Curie, Fulbright, and Humboldt awards—this project provides a high-impact platform for career development in applied mechanics and biomechanics.

**Candidates should provide detailed CV**

**Candidates must be eligible according to the criteria established by the 2026 MSCA Postdoctoral fellowship call:**

- to have a PhD by the call deadline.
- to have up to 8 years of research experience after PhD.
- to be citizens of an EU State or of an Associated Country.



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- not to have resided or carried out their main activity in Italy for more than 12 months in the 36 months before the call deadline.

## **Contacts**

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