**Università Politecnica delle Marche**

**PhD Program in "Civil, Environmental and Building Engineering, and Architecture"**

## SEMINAR ANNOUNCEMENT

# Playing with unstable architected materials

Prof. Davide Bigoni

University of Trento, Italy

**Monday 18 November 2024** at **11.30**
Aula Seminari DICEA, sezione Strutture, Q150 (DICEA-150/stru)

A careful design of prestressed architected materials leads to the control of material instabilities, both for compressive [1] and tensile axial forces [2]. Moreover, the architecture of the analyzed structures leads to the emergence of multiple band gaps, flat bands, and Dirac cones [3].
The experience gained on structural flutter [4, 5] is exploited to implement a new concept, namely, the possibility of surpassing hyperelasticity to obtain elastic materials in which strain energy does not exist [6]. This concept paves the way for new micro and nano technologies and offers clear applications, particularly in areas such as energy harvesting.

Acknowledgements Financial support from ERC-ADG-2021-101052956-BEYOND is gratefully acknowledged.

*References*

[1] *Bordiga, G., Cabras, L., Piccolroaz, A., and Bigoni, D. "Dynamics of prestressed lattices: Homogenization, instabilities, and strain localization" J. Mech. Phys. Solids, 146, 104198 (2021).*
[2] *Bordiga G., Bigoni D. and A. Piccolroaz "Tensile material instabilities in elastic beam lattices lead to a closed stability domain". Phil. Trans. Royal Soc. A, Vol. 380, 20210388, (2022).*
[3] *Cabras, L., Bigoni, D., and Piccolroaz, A. Dynamics of elastic lattices with sliding constraints. Proc. Royal Soc. A 480, 20230579, 2024.*
[4] *Rossi, M., Piccolroaz, A., Bigoni, D., "Fusion of two stable elastic structures resulting in an unstable system" J. Mech. Phys. Solids, 173, 105201 (2023).*
[5] *Bigoni, D., Dal Corso, F., Kirillov, O., Misseroni, D., Noselli, G., Piccolroaz, A. Flutter instability in solids and structures, with a view on biomechanics and metamaterials. Proc. Royal Soc. A 479, 20230523 (2023).*
[6] *Bordiga, G., Piccolroaz, A., and Bigoni, D., "A way to hypo-elastic artificial materials without a strain potential and displaying flutter instability" J. Mech. Phys. Solids, 158, 104665 (2022).*

***All interested people, particularly PhD students, are invited to attend the seminar***

This activity is part of the 2023/27 "Dipartimento di Eccellenza" project of DICEA.

**For further information, please contact: Stefano Lenci, DICEA, s.lenci@univpm.it.**