

Dr. Eduardo M. Bringa



Título de la charla:

Mechanical properties of technologically-relevant materials: from nano to macroscales

Resumen

Adequate mechanical properties are crucial for many technological applications. There is an increasing need for materials with high strength under extreme conditions: high temperature, high radiation dose, corrosive environments, etc. High-entropy alloys (HEA) are strong candidates for many of these applications. I will discuss several examples of nano-scale MD (molecular dynamics) simulations of alloys with different structure and composition, including alloys with two co-existing phases. There are many possible plastic deformation channels, including dislocations, twinning, and sub-grain formation, which control deformation behavior, and their relevance depends on the material, temperature, and strain-rate.

At larger micro-scale, simulations can be achieved with granular mechanics using DEM (Discrete-Element Method), and a few examples of impacts will be shown, with application to astrophysical problems. Finally, macro-scale simulations using BPM (Bonded-Particle Model) will be shown, reproducing the behavior of 3D printed materials. In particular, a case of interlocking plastic particles, which can achieve high strength despite their low packing density, and a case of printed cement, where Bouligand structures improve resistance to impact fracture.

Sobre el expositor:

Eduardo Bringa es Investigador Principal del CONICET en el grupo SIMAF de la Facultad de Ingeniería de la Universidad de Mendoza y Profesor en la Facultad de Ingeniería de la Universidad Nacional de Cuyo. Su trayectoria académica incluye estudios en Física en la Universidad Nacional de San Luis y el Instituto Balseiro, un doctorado en la Universidad de Virginia (USA), así como experiencia profesional en el Lawrence Livermore National Laboratory (USA). A través de técnicas de Dinámica Molecular y métodos multiescala, su trabajo ha permitido comprender mejor las propiedades mecánicas de los materiales bajo condiciones extremas. Cuenta con más de un centenar de publicaciones con más de 10000 citas, y colaboraciones con laboratorios de Latinoamérica, Estados Unidos y Europa.