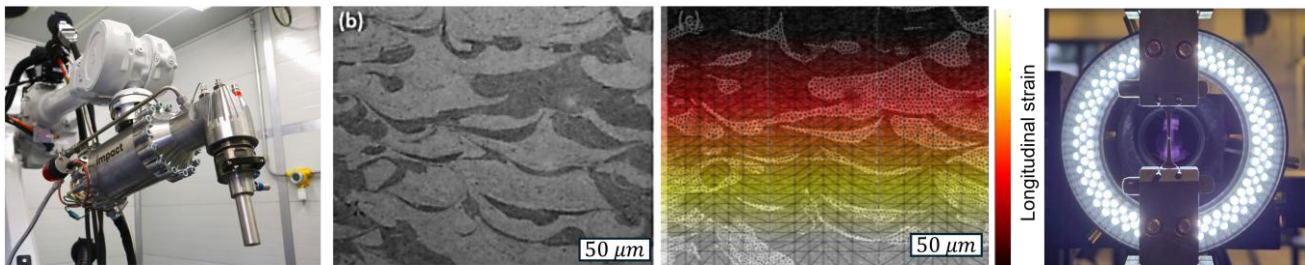


***In-situ* micrometric study of the tensile failure of Ni-Cu composites produced by cold-spray technology**

Key words. cold-spray, *in-situ* mechanical experiments, damage, metallic composites, digital image correlation (DIC).

Context. Recent progress in additive manufacturing technologies, today mature even for metals and metallic alloys, have enabled the design and manufacturing of advanced metallic composites and alloys that combine lightweight with multifunctional properties. For example, it is possible to manufacture aircraft engine components with complex geometries (see Fig. 4 in Blakey-Milner et al., 2021) and to achieve significant (e.g., up to 40 %) weight reduction of structural components by replacing Ti with Al alloys. As a result, significant efforts have been recently devoted to improving the durability of additively manufactured metallic materials.

Objective. The goal of this internship project is to use advanced experimental techniques to study *in situ* the failure mechanisms of **Ni-Cu metallic composites**. The test samples will be manufactured by the **cold-spray** process (Falco et al., 2025) and exhibit a highly contrasted microstructure (see Figure 1), in which the two monolithic phases (Ni and Cu) can be identified together with the process-induced defects (notably porosity). To investigate the failure mechanisms at the scale of the microstructure, an ***in-situ* test protocol** (under either SEM or optical microscope) will be developed and the collected images will be analyzed by **Digital Image Correlation** (DIC) in order to measure the 2D strain fields (Salvi et al. 2024).



Cold-spray process and resulting composite microstructure DIC-measured strain field via in-situ testing (from left to right)

Figure 1. Scientific strategy to be pursued during the internship subject, relying on both cold-spray technology and in-situ experiments combined with Digital Image Correlation (DIC).

Resources provided:

- Ni-Cu composite materials produced by cold spray at Archès Laboratory at Politecnico di Milano ([Home - Archès Lab](#));
- Image correlation codes and image processing software available within the Eikologie team at LMPS (<https://lmeps.ens-paris-saclay.fr/en/ro2-eikology>)
- In situ testing machine available at LMPS ([Accueil | LMPS](#))
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Useful Information:

	Internship's duration: 5-6 months starting from Jan. 2027
	Laboratoire de Mécanique Paris Saclay (LMPS), Université Paris Saclay, CentraleSupélec, ENS Paris-Saclay, CNRS.
Supervisors:	Prof. Sara Bagherifard (Associate Professor, Politecnico di Milano) and Prof. Gabriella Tarantino (Associate Professor, LMPS).
Scholarship	600 €/month + transport card

Application :

Interested candidates are asked to send their **CV + MSc academic track record** (relevé de notes M1+M2) at:

- Prof. Gabriella Tarantino (gabriella.tarantino@centralesupelec.fr) and
- Prof. Sara Bagheri (sara.bagherifard@polimi.it)

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