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## X-ray 4D multimodal testing & simulations to study crystal plasticity

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This talk aims to showcase a new type of methodology, applied on commercially pure Titanium samples, combining X-rays with laboratory based techniques (SEM, in situ EBSD) and simulations with the objective to probe polycrystal plasticity at both mesoscopic and microstructural scales [1].

In particular, Diffraction Contrast Tomography (DCT - developed at ESRF) allows reconstruction of 3D digital grain maps containing thousands of grains on which simulations can be run directly [2]. A crystal plasticity finite strain model is implemented within a massively parallel FFT solver framework for volume computations [3]. In the meantime FEM simulations are performed on surface EBSD maps.

Convergence of innovative experimental and numerical techniques leads to multimodal and rich but unconsolidated massive datasets. A data platform was thus developed to structure the data and enable concurrent analysis of the various modalities. Mechanisms of interest in the present study include slip activity, stress field and lattice rotation evolution at grain level.

### References

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