

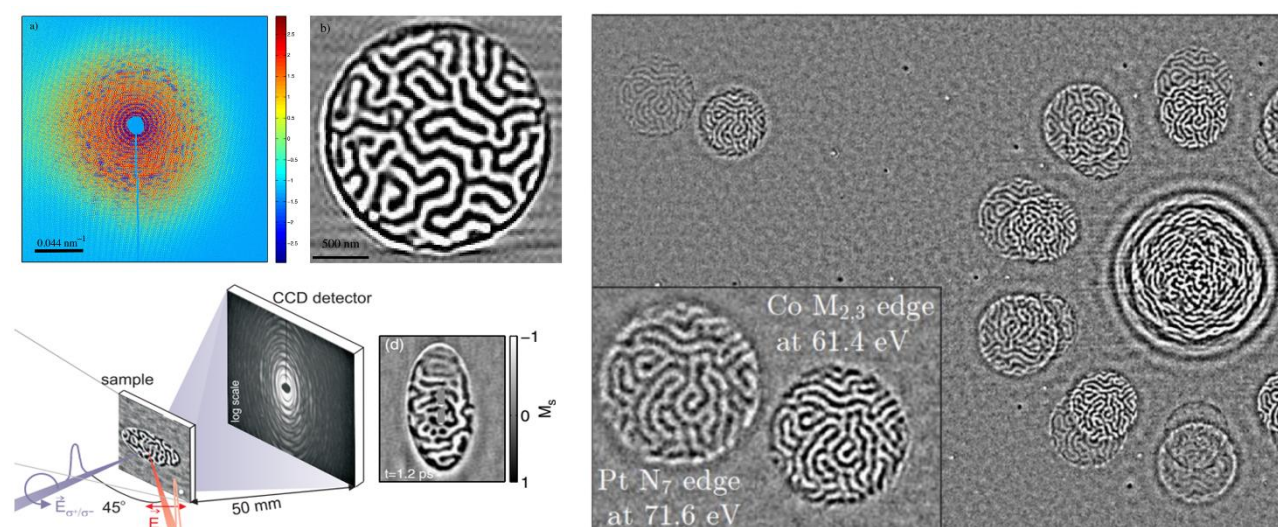
## Magnetization dynamics at FERMI seeded FEL

Emanuele Pedersoli

Elettra – Sincrotrone Trieste SCpA, Trieste, 34149, ITALY

email: emanuele.pedersoli@elettra.eu

FERMI is a seeded free electron laser providing ultrafast EUV light pulses with very specific characteristics of coherence, intensity and wavelength tunability and stability, temporal and spectral cleanliness, variable linear and circular polarization, intrinsic femtosecond synchronization with the seeding optical laser. DiProI can take advantage of these features, studying ultrafast magnetic dynamics through time resolved magnetic holography [1], double resonant two-color EUV experiments [2-3], resonant magnetic reflectivity [4] and scattering [5], magnetization reversal probed by Kerr and Faraday effects.



**Figure 1:** Examples of experimental layout, diffraction patterns and domain holographic reconstructions on agnetic metallic multilayers. In the right side a holographic image is showing domain patterns obtained with resonant two color pulses tuned on Co and Pt edges [5].

### References:

- [1] C. von Korff Schmising *et al.*, *Imaging Ultrafast Demagnetization Dynamics after a Spatially Localized Optical Excitation*, *Phys. Rev. Lett.* **112**, 217203 (2014). doi:10.1103/PhysRevLett.112.217203.
- [2] E. Ferrari *et al.*, *Widely tunable two-colour seeded free-electron laser source for resonant-pump resonant-probe magnetic scattering*, *Nat Commun.* **7**, 10343 (2016). doi:10.1038/ncomms10343.
- [3] F. Willems *et al.*, *Multi-color imaging of magnetic Co/Pt heterostructures*, *Structural Dynamics* **4**, 014301 (2017). doi:10.1063/1.4976004.
- [4] T. Sant *et al.*, *Measurements of ultrafast spin-profiles and spin-diffusion properties in the domain wall area at a metal/ferromagnetic film interface*, *Scientific Reports* **7**, 15064 (2017). doi:10.1038/s41598-017-15234-7.
- [5] L. Müller *et al.*, *Ultrafast Dynamics of Magnetic Domain Structures Probed by Coherent Free-Electron Laser Light*, *Synchrotron Radiat. News.* **26**, 27–32, (2013). doi:10.1080/08940886.2013.850384.