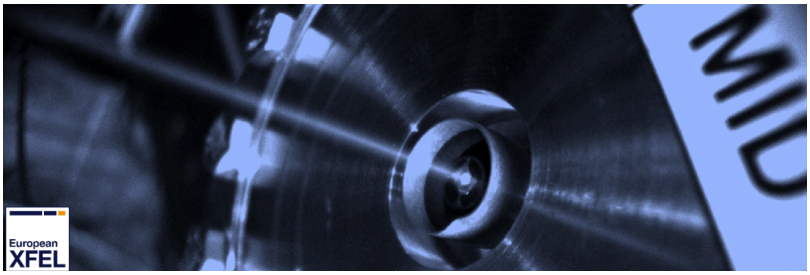

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The ”Shock” Beamtime Allocation Group at beamline ID19 of the ESRF

Thursday 19 January 2023 19:23 (7 minutes)

4^{th} generation high-energy synchrotron photon sources offer unprecedented capabilities of probing matter during transient dynamics at high spatio-temporal scales using hard X-rays. The combination of high brilliance, short bunch duration (down to 60~ps) and high-energy of the extremely brilliant source at ESRF-EBS[1] opens the door of studying materials under extreme events of shock and high-strain rate combined to *in-situ* subsurface ultra-high speed X-ray radioscopy measurements at relevant scales[3]. The recent establishment of new access modes[2], such as beamline allocation groups (BAG), aim at building a collaborative community and providing regular access to the shared pool of cutting-edge installations. The so-called “Shock” BAG brings together experts in shock physics and dynamic behaviour of materials, building upon the recently installed instrumentation such as Split-Hopkinson Pressure bar (SHPB), single stage gas launcher, ns-pulsed laser shock and pulsed power-driver as well as a chamber compatible with energetic materials which allow studying matter under a plethora of extreme scenarios. The community-driven scientific topics tackle the growing demand of developing novel engineering materials with the ability to sustain the high strain rate and shock as well as fundamental physical questions of material phase change and instabilities of shocked matter. Recently, the first experimental campaigns have been successfully conducted using the SHPB and gas gun installations, with applications ranging from reproducing earthquake scenarios and dynamic fracture of novel composite and additively manufactured materials, to shock propagation and dynamically driven cavity collapse, of which selected examples will be showcased.

[1] P. Raimondi, (2016). ESRF-EBS: The Extremely Brilliant Source Project, Synchrotron Radiation News, 29(6), 8-15.
[2] J. McCarthy, H. Reichert, (2022). ESRF Prepares New User Access Mode, Synchrotron Radiation News, 35(2), 52-54.
[3] M. Olbinado, X. Just, J-L Gelet, P. Lhuissier, M. Scheel, et al. (2017). MHz frame rate hard X-ray phase-contrast imaging using synchrotron radiation, Optics Express, 25(12), 13857-13871.

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