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Time resolved and Extreme conditions X-ray Absorption Spectroscopy (TEXAS) at the European Synchrotron Radiation Facility
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The ESRF has started an ambitious project spread over 10 years aimed at an upgrade of the accelerator, beamlines and infrastructure. One of the first upgrade beamlines (UPBLs) to become operational, UPBL11, is totally dedicated to Time resolved and Extreme conditions X-ray Absorption Spectroscopy (TEXAS). This facility, based on the upgrade of the former energy dispersive XAS beamline ID24, will provide the user community new opportunities for investigating matter at extreme conditions of pressure, temperature and magnetic field. Target experiments for the future include kinetic studies of chemical reactions at high pressure and temperature, and investigation of extreme states of matter that can be maintained only over very short periods of time. Since UPBL11 has only recently been opened to user operation, I will first give a brief overview of results obtained on the former ID24 in the area of extreme conditions. Examples cover element selective magnetometry under pulsed magnetic fields of 30T, studies of chemical reactions that occur in the interior of planets, the investigation of pressure induced collapse of ferromagnetism in 3d metals, and first attempts to probe the electronic and local structure in melts at high pressures. Then I will illustrate the status and the performance of the new dedicated experimental setups for extreme conditions on UPBL11. First results from the new laser heating facility able to reach the multi-megabar regime at temperatures above 4000 K and the pulsed high magnetic field facility for XAS studies under fields up to 35 T and temperatures down to 1.5 K will be given. I will conclude with a few ideas for future experiments that exploit the advantages of the energy dispersive optical scheme for the study of matter under conditions so extreme that they can be maintained only for very short periods of time.