	Experiment title: Physical aging in metallic glasses at the atomic lengthscale	**Experiment number**: HC880
Beamline:	**Date of experiment**: from: 10/07/2013 to: 16/07/2013	**Date of report**: 17/10/2013
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Report:

Despite decades of studies, very little is known on glasses at the atomic level, due to both experimental and numerical simulation limitations. Therefore almost all the theories deal with the dynamics in supercooled liquids and no information on the microscopic behavior of glasses are available so far.
Thanks to the developments in the collection of sparse scattering signals and to an increased flux and coherence of X-ray beams, XPCS has recently emerged as a very powerful technique able to follow the evolution of the intermediate scattering function (ISF) at the atomic length scale.
The goal of the proposed experiment was to follow the temporal evolution of the ISF from the metastable glassy state to the equilibrium supercooled liquid phase in different metallic glasses.
Different series up to 4000 imgs of speckels pattern have been collected in a wide angle configuration by two bidimensional detectors placed vertically symmetric with respect to the incoming beam.
Due to technical problems, we could not mount the two detector horizzontaly, as proposed in the proposal. This configuration came out to require some small modification in the sets up, which were not possible to performed during the experiment. Notwithstanding we have been able to measure accurately the atomic dynamics in our systems and the analysis is still ongoing.
We find a very peculiar evolution of the dynamics which strongly differ from that usually observed from the temporal evolution of macroscopic quantites like the viscosity or the elastic moduli. Instead that reach the corresponding supercooled liquid value, the dynamics in the glassy state evolves with time up to an almost stationary regime, where the measured intensity correlation functions do not evolve anymore with time, on an

experimental time scale of several hours. In order to elucidate this very peculiar behavior, we will perform additional macroscopic measurements by using the same thermal protocols employed during the XPCS measurements. A very similar stationary plateau in the glassy state has been recently observed also during enthalpy relaxation measurements in polymeric glasses, suggesting a more general scenario.