ESRF	**Experiment title:** Fluctuations of the Central peak phenomenon in SrTiO3 studied by XPCS	**Experiment number**: HS2539
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Report:

The goal of this experiment was to study the central peak phenomenon in SrTiO3 by cohérent scattering. Peliminary experiments have been performed at the ID10a and the ID01 beamlines of the ESRF. The results presented here were obtained at ID10a, using a Si(111) single crystal monochromator to get 8 keV x-rays. A SrTiO3 single-crystal, grown by the top-seeded technique, with a 4mm*4mm polished [110] face, was mounted in a top-loading cryostat and aligned with the (311) and (1,-1,-2) directions in the horizontal scattering plane. The geometry of diffraction to reach the Qs=(3/2,1/2,1/2) superstructure reflection (Bragg angle θ=19.2°, Qs=2.68 A^{-1}) was thus strongly asymmetric with the incident angle θ=13° and the exit angle θ=25.4°.Given the μ^{-1}=17µm penetration length of 8 keV x-rays, this leads to an effective penetration of 3.8µm.

The conditions to get a coherent beam were obtained by using 10µm*10µm entrance slits (playing the role of pinhole) 20 cm before the sample.The beam quality and its intrinsic degree of coherence were tested by using 2µm*2µm entrance slits, in order to observe their regular interference fringes in the Fraunhofer regime.

Guard slits have been placed after the entrance slits to reduce parasitic slit scattering. The patterns were recorded on a direct illumination CCD camera (20µm*20µm pixel size) located 1.8 m after the sample, yielding a resolution of 4.5 10-5 A^{-1} per pixel.

The main result is summarized on the figure 1. At two different beam positions on the sample, we have observed the three contrbutions, usually observed either by neutrons or classical X-rays: the broad component containing the Central peak and the soft mode contrbution and the second length scale (or narow component) from the skin layer.

Thanks to the microbeam x-ray coherent diffraction patterns, we have shown that the broad (short-length scale) and the narrow (long-length scale) components can be spatially disentangled, due to 100 µm-scale spatial variations of the latter. Moreover, both components exhibit a speckle pattern, which is static on a 10 mn time-scale. This gives evidence that the narrow component corresponds to static ordered domains. We interpret the speckles in the broad component as due to a very slow dynamical process, corresponding to the well-known *central* peak seen in inelastic neutron scattering.

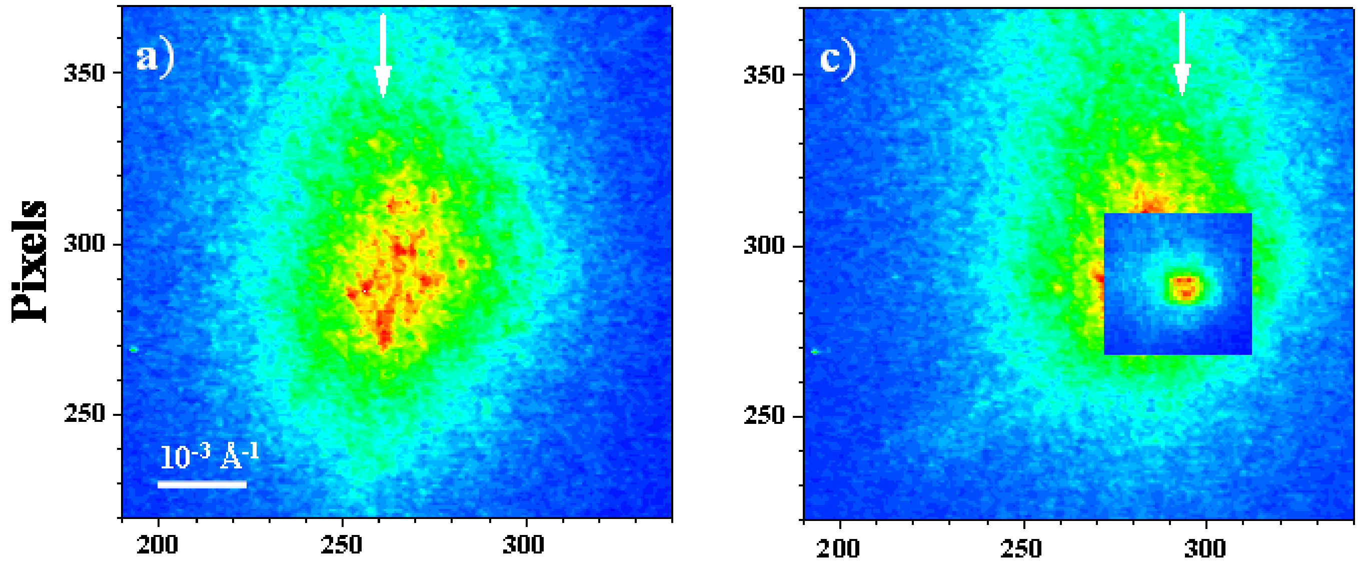

Fig. a) and c) 2D patterns obtained at the Qs superstructure peak intensity position for two different z-positions of the beam. The same logarithmic color scale is used for both images. Those two figures show that the large and the naroww component can be spatially disentangled.