

Dynamic critical scattering by XPCS in the ordering AuAgZn₂ alloy

Frédéric Livet¹, Guillaume Beutier¹, Mathieu Fèvre², Mark Sutton³, Fati Abouhilou⁴, Yuriy Chushkin⁵, Federico Zontone⁵

1-SIMAP, CNRS-Université de Grenoble, frederic.livet@simap.grenoble-inp.fr

2-ONERA, Chatillon sous Bagneux

3-McGill, Montreal

4-U. H. Boumedienne, Alger

5-ESRF, Grenoble

The dynamics of the order fluctuations in the AuAgZn₂ close to the critical point ($T_c \sim 609$ K) was observed by coherent x-ray scattering [1]. With the high beam intensity of the ID10 ESRF beamline and with the new pixel detector, the dynamics was measured with a few tens of millisecond resolution. The intensity connected to the diffuse scattering corresponding to fluctuations was unambiguously distinguished from the surface pretransitional ordering occurring in this system close to T_c . The variations of the fluctuation time with temperature and wave vectors were measured in this system belonging to the universality class of Ising second order transition with a non-conserved order parameter. The direct observation of the critical slowing down in the vicinity of the second-order transition led to an estimate of the dynamic exponent $z=1.96(11)$, in rough agreement with theory (model "A" of [2]).

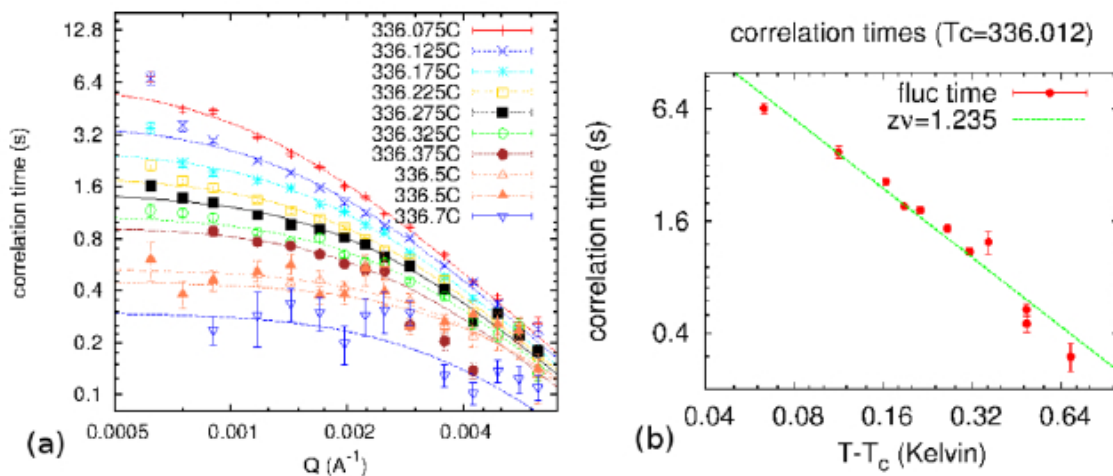


Figure 1: (a) Fluctuation times $\tau(q, T)$ for various temperatures and the Lorentzian fits. (b) Temperature variations of $\tau_0(T)$. An estimate of the exponent yielded $z\nu = 1.235(70)$.

References

- [1] F. Livet, M. Fèvre, G. Beutier, F. Zontone, Y. Chushkin and M. Sutton, Phys. Rev. B 92, 094102 (2015)
- [2] - P. C. Hohenberg and B. I. Halperin, Rev. Mod. Phys. 49, 436 (1977)