Spatio-temporal migration of antiferromagnetic domain walls in Sr_2IrO_4

Ian Robinson[1,2], David Yang[1], Ross Harder[3], Dina Sheyfer[3], Longlong Wu[1,4], Jack Griffiths[1], Emil Bozin[1,5], Mark P. M. Dean[1], Jialun Liu[2], Hengdi Zhao[6], Gang Cao[6], Angel Rodriguez-Fernandez[7], Jan-Etienne Pudell[7], Roman Shayduk[7] James Wrigley[7], Alexey Zozulya[7], Rustam Rysov[7], Aliaksandr Leonau[7,8], Ulrike Boesenberg[7], Joerg Hallmann[7] and Anders Madsen[7]

1. Condensed Matter Physics and Materials Science Division, Brookhaven National Laboratory, Upton NY 11973, USA
2. London Centre for Nanotechnology, University College, London, WC1E 6BT, UK
3. Advanced Photon Source, Argonne National Laboratory, Lemont IL 60439, USA
4. Shanghai Advanced Research Institute, Chinese Academy of Sciences, Shanghai 201210, China
5. Center for Solid State Physics and New Materials, Institute of Physics, University of Belgrade, 11080 Belgrade, Serbia
6. Department of Physics, University of Colorado at Boulder, Boulder, CO 80309, USA
7. European X-ray Free-Electron Laser Facility, 22869 Schenefeld, Germany
8. Department Physik, Universität Siegen, 57072 Siegen, Germany

SUPPLEMENTARY FIGURES

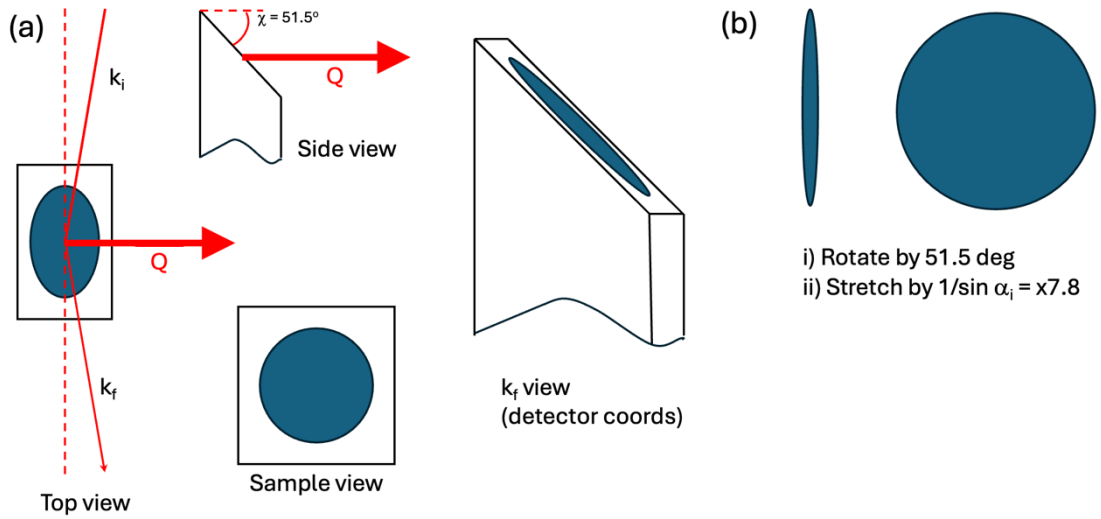

Figure S1: (a) Diffraction geometry of the X-ray setup at the MID instrument of XFEL. The Q-vector lies in the horizontal plane, and the sample face is tilted by 51.5° to reach the 106 reflection (b) coordinate transformation required to convert the reconstructed image from the detector view into the surface-normal view.

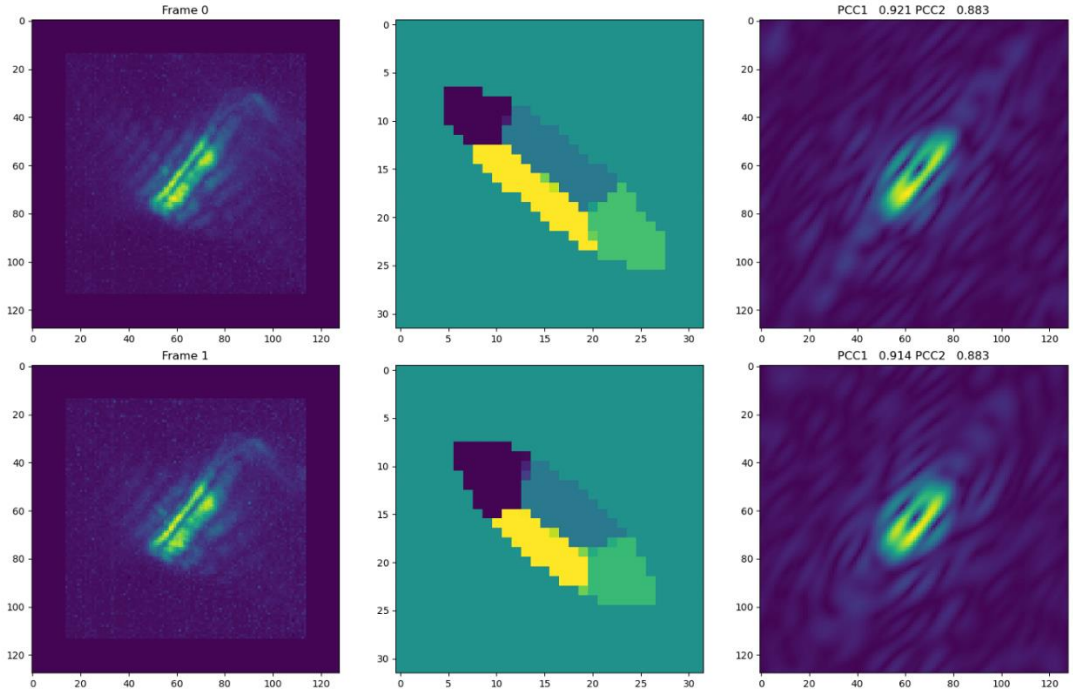

Figure S2: Fitting of the 4-domain model to the XFEL magnetic coherent diffraction data summed over ranges -5 ps < Δt < 0 (frame 0, top) and 0 < Δt < +5 ps (frame 1, bottom). The first column is the measured diffraction amplitude, the second column is the fit model colored according to the values of the phases and the third column is the best-fitting diffraction amplitude distribution.

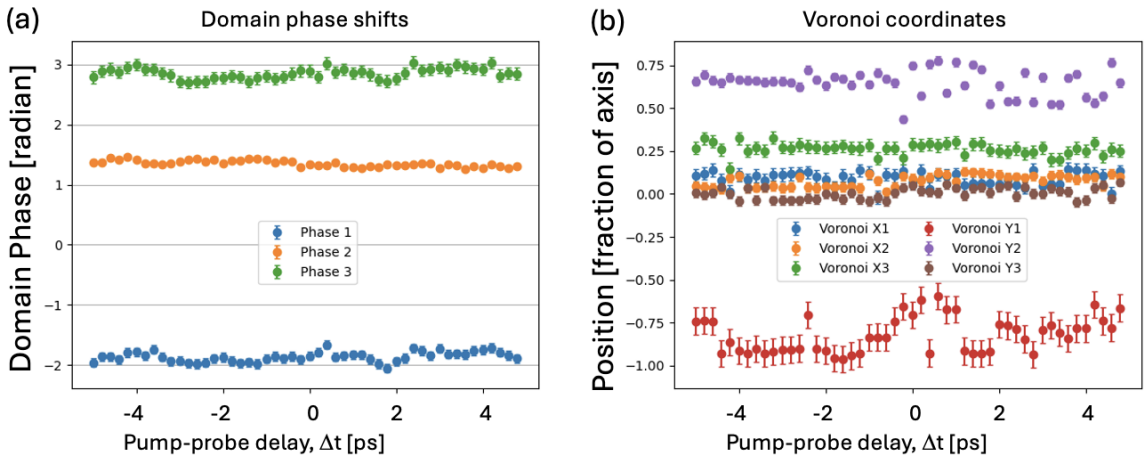

Figure S3: Time dependence of the other parameters of the model listed in Table 1, used to fit the diffraction pattern. (a) Domain phase shifts. (b) Voronoi (x,y) coordinates as a fraction of the axis length of the ellipse, as listed in Table 1. The fourth domain is fixed at (0,0) with a phase of 0.