

Dynamic Pathways in Multidimensional Landscapes



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Multidimensional Landscapes

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Phase separation in complex oxides: RTiO_3

Content :

Author:

B. Shi: Van der Waals-Zeeman Institute, University of Amsterdam, the Netherlands

Co-authors:

J. B. Goedkoop, M. S. Golden: Van der Waals-Zeeman Institute, University of Amsterdam, the Netherlands

C. Schüssler-Langeheine : Helmholtz-Zentrum Berlin, Germany

M. Buchholz, C. Trabant, C. F. Chang: II. Physikalisches Institut, Universität zu Köln, Germany

A. Ricci, C. Gutt, M. Sprung: HASYLAB@DESY, Hamburg, Germany

H. A. Dürr: SIMES, SLAC National Accelerator Laboratory and Van der Waals-Zeeman Institute, University of Amsterdam, the Netherlands

A. Robert, M. Sikorski, S. Song, R. Curtis: LCLS

Complex oxides display an unparalleled richness of physical phenomena arising from the coupling of their charge, spin and orbital degrees of freedom, with cuprate high T_c superconductors and colossal magnetoresistive (CMR) manganites as flagship materials systems. For the CMR systems, phase separation is believed to play a crucial role in creating the hypersensitivity to external stimuli such as external field [1]. In this contribution I will report our experiments on perovskite titanate systems, which are a t_2g materials analogy to the CMR systems with which they share much underlying physics.

In particular, I will deal with calcium-doped rare earth titanium oxides, which exhibit charge and orbital ordering (CO/OO) during a temperature-driven metal-insulator transition (T-driven MIT). These systems are hypersensitive to the tuning of the hole-doping level, whereby the electrical transport then differs by several orders of magnitude [2], as occurs with external field in the CMR manganites. In this talk, I will present recently recorded data aimed at the investigation of the phase separation dynamics during T-driven MIT in titanates at LCLS using X-ray photon correlation spectroscopy techniques [3]. This is the first time that the single crystal coherent x-ray diffraction patterns have been recorded at 120Hz in the time domain.

References:

[1] E. Dagotto, T. Hotta, and A. Moreo, *Physics Report* 344, 1 (2001).

[2] A. C. Komarek, M. Reuther, T. Lorenz, A. Cousson, P. Link, W. Morgenroth, D. Trots, C. Baehtz, M. Braden, *arXiv:1109.0234v1*, 3 (2011).

[3] S. Konings, C. Schüssler-Langeheine, H. Ott, E. Weschke, E. Schierle, H. Zabel, J. B. Goedkoop, *Physical Review Letters* 106, 077402 (2011).

Primary authors : Mr. SHI, Bo (University of Amsterdam)

Co-authors :

Presenter : Mr. SHI, Bo (University of Amsterdam)

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Co-authors: They didn't register yet, I would rather not create their names there myself.

Van der Waals-Zeeman Institute, University of Amsterdam, the Netherlands

Jeroen B. Goedkoop

Mark S. Golden

Helmholtz-Zentrum Berlin, Germany

Chrisitan Schüssler-Langeheine

Christoph Trabant

II. Physikalisches Institut, Universität zu Köln, Germany

Marcel Buchholz

Christoph Trabant

Hasylab at DESY, Hamburg, Germany

Alessandro Ricci

Chrisitan Gutt

Michael Sprung

SIMES, SLAC National Accelerator Laboratory, USA, and Van der Waals-Zeeman Institute,
University of Amsterdam, the Netherlands

Herrmann A. Dürr

Linac Coherent Light Source, X-ray Correlation Spectroscopy group, SLAC National
Accelerator, USA

Aymeric Robert

Sanghoon Song

Marcin Sikorski

Robin Curtis

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