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Title: MaRIE: Opportunities for new x-ray sources to shed light on mesoscale functional materials

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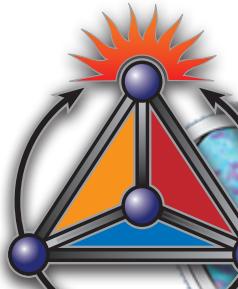
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# MaRIE



## Opportunities for New X-ray Sources to Shed Light on Mesoscale Functional Materials

July 21 & 22, 2016

Los Alamos National Laboratory, Los Alamos, New Mexico

Sponsors: MaRIE ([marie.lanl.gov](http://marie.lanl.gov)); Institute for Materials Science ([ims.lanl.gov](http://ims.lanl.gov))

The development of new femtosecond x-ray free electron lasers (XFEL)—such as Linac Coherent Light Source (LCLS) at SLAC National Accelerator Laboratory, SACLAC in Japan, and the European XFEL—has enabled groundbreaking discoveries in biology, chemistry, materials science, and physics. At Los Alamos National Laboratory, the first very hard (42-keV) XFEL, part of the MaRIE (Matter and Radiation in Extremes) facility, is being developed to study the dynamic properties of materials under extreme conditions for national security science missions.

### INVITED SPEAKERS INCLUDE

Dr. Gabriel Aeppli – Paul Scherrer Institute

Prof. Robert Schoenlein – LCLS/SLAC

Dr.

Prof.

Prof.

Prof.

Dr.

Prof.

Prof.

## OBJECTIVE

The goal of this workshop is to explore the scientific opportunities that would open up in fundamental materials science from the unique photon energy (42 keV) and time structure ( $> 5$  micro-pulses/macro-pulse with  $10^{11}$  coherent photons/micro-pulse) of the MaRIE XFEL. Some questions that will be explored include:

- How does one link micro-to-macro under dynamic loading?  
(*the multiscale problem, related to the BESAC mesoscale challenge*)
- How do we design and synthesize materials that enhance our control of dynamic processes?  
(*the co-design problem, related to the Materials Genome Initiative*)
- What are the transformative new diagnostics, drivers, and predictive models needing development?  
(*transformative technology*)

These issues will be discussed in the context of several different classes of materials, including strongly correlated electron systems, structural materials (including semiconductors, metals, and ceramics), nanomaterials (e.g., nanowires, quantum dots, two-dimensional materials, organics), with an emphasis on controlled functionality. Novel techniques for using x-rays to shed light on dynamic material properties will also be discussed. The outcome of this workshop will guide the future development of the MaRIE facility and potential first experiments for this novel light source.

## ORGANIZING COMMITTEE

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