

**CMP Seminar**  
**Michigan State University**

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**Argonne National Laboratory**

***Shining X-ray Light on Strongly Correlated Materials***

Strongly correlated materials can exhibit intriguing phenomena such as superconductivity, quantum magnetism, and topological order. These systems have various potential applications, and X-ray spectroscopies are widely employed to characterize their properties. In this talk, I will present large-scale X-ray simulations in two systems. I will first discuss vanadium sesquioxide V<sub>2</sub>O<sub>3</sub> under pressure. The X-ray Raman spectra of a novel monoclinic V<sub>2</sub>O<sub>3</sub> metal highlight electron screening and correlation in driving the material's metal-insulator-transition. I will next discuss the X-ray absorption spectra of the cuprate superconductor La<sub>2</sub>CuO<sub>4</sub>. A dynamical spectral weight transfer upon doping confirms the material's correlated nature and the continuation of effective singlet quasiparticles. I will conclude by describing research projects and plans for modeling non-equilibrium dynamics in ultrafast spectroscopies. Along with experimental progress, these studies show that development in theoretical spectroscopy and computational method could substantially help advance research in complex quantum materials.

**Monday, February 15, 2016**

**4:10 p.m.**

**BPS 1400**

**Prof. Carlo Piermarocchi - Host**