



Contribution ID: 231

Type: Talk

【170】 Evolution of Electron-Phonon Coupling across the Metal-Insulator Transition of Rare-Earth Nickelates

Friday, 3 September 2021 13:30 (15 minutes)

Rare-earth nickelates, $RNiO_3$, are negative charge-transfer materials with electronic configuration of $Ni-3d^8 \underline{L}$ (\underline{L} = oxygen ligand hole) in their metallic state. Most $RNiO_3$ undergo low-temperature metal-to-insulator transition (MIT) accompanied by breathing distortion in their crystal structure, where neighboring expanded NiO_6 octahedra ($Ni-3d^8$ configuration) alternate with collapsed NiO_6 ($Ni-3d^8 \underline{L}^2$). Here, using resonant inelastic x-ray scattering, we reveal that the electron-phonon coupling (EPC) of the breathing-mode phonon significantly increases as $NdNiO_3$ undergoes MIT. Meanwhile, no significant changes are observed in the EPC of $LaNiO_3$ ($SmNiO_3$), which stays metallic (insulating) at all studied temperatures. These results confirm the major role that the breathing distortion and its EPC play in the MIT of $RNiO_3$.

Primary authors: ASMARA, Teguh Citra (Paul Scherrer Institute); DOMINGUEZ, Claribel (University of Geneva); ZHANG, Wenliang (Paul Scherrer Institut); Dr FOWLIE, Jennifer (University of Geneva); TSENG, Yi (Paul Scherrer Institut); PARIS, Eugenio (PSI - Paul Scherrer Institut); PELLICIARI, Jonathan (MIT); Dr BARBOUR, Andi (Brookhaven National Laboratory); Dr JARRIGE, Ignace (Brookhaven National Laboratory); Dr JOHNSTON, Steven (University of Tennessee); Prof. GIBERT, Marta (University of Zurich); Dr BISOGNI, Valentina (Brookhaven National Laboratory); Dr TRISCONI, Jean-Marc (University of Geneva); SCHMITT, Thorsten (Swiss Light Source, Paul Scherrer Institut)

Presenter: ASMARA, Teguh Citra (Paul Scherrer Institute)

Session Classification: Condensed Matter Physics

Track Classification: Condensed Matter Physics (KOND)