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Reduced dimensionality and emerging material property in perovskite oxide superlattices: A first-principles study

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Artificially-structured oxide superlattice is a fascinating playground for the new material functionality originated from strong electronic 'Correlation'. When the conventional bulk material becomes 2D-like, the intriguing 'Correlated Phenomena' can emerge as a result of cooperation between the spin, orbital and lattice degree of freedom. As one typical example, we present our calculation results on the nickelate superlattice, $LaNiO_3/LaAlO_3$. Based on the first-principles density functional theory calculation combined with the state-of-the-art 'Many-body' techniques, we examined the possibility of unconventional superconductivity and emerging magnetic order in the thin $LaNiO_3$-limit. The dynamic as well as static 'Correlation Effect' has been analyzed and the results are compared with recent experimental reports.

Biography

Myung Joon Han has completed his PhD in Seoul National University. After spending five years in Post-doctoral studies at U C Davis, Columbia University and Argonne National Lab in USA, he joined KAIST as a Faculty Member. He is now an Associate Professor of Physics and also of KAIST Institute for Interdisciplinary Research.

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