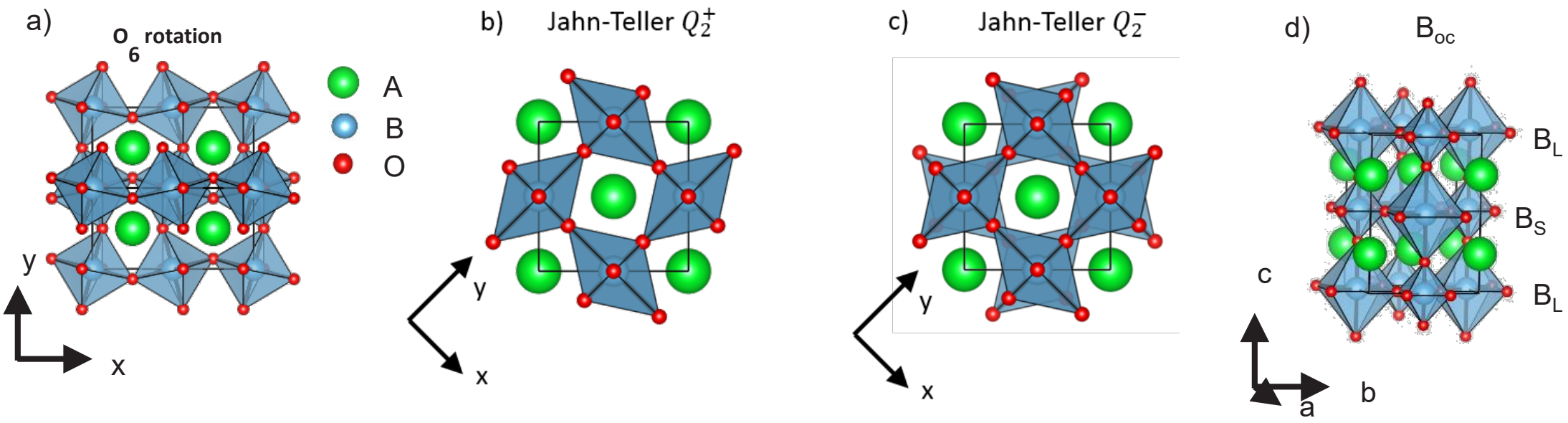
Mortimer and Raymond Sackler Institute of Advanced Studies
IAS Distinguished Scholars

המכון ללימודים מתקדמים
ע"ש מורטימר וריימונד סאקלר
עמיתים מיוחדים במכון

TEL AVIV UNIVERSITY אוניברסיטת תל אביב



פרופסור אלכס צונגר
מכון לאנרגיה מתחדשת ובת קיימא
אוניברסיטת קולורדו בבולדר
בולדר, קולורדו, ארה"ב

Professor Alex Zunger
Renewable and Sustainable Energy Institute
University of Colorado Boulder
Boulder, Colorado, USA

Condensed Matter Seminar | סמינר בחומר מעובה

THE RISE AND FALL OF INSULATING BAND GAPS IN D-ELECTRON OXIDE PEROVSKITES

Abstract

The seminal 1937 spectroscopic observation by De Boer and Verwey of the insulating character of paramagnetic phases of d electron oxides led N. Mott to the celebrated conclusion that this must be intrinsically a many-body effect, since single-particle band theory would invariably predict an erroneous metallic state in such "Mott" Insulators. This conclusion marked the historical shift in the field - reborn with vengeance with the discovery of high Tc superconductors - placing the focus of attention on the strongly correlated electrons, almost to the exclusion of the effects of ions and spins. This talk will review recent re-examination of this classic paradigm. It turns out that the dismissal of band theory was premature, as it was based on consideration of averaged crystallographic unit cells, a description that washes out all possible local symmetry breaking modes. When such lattice effects are allowed, one finds (i) lower total energy, concomitantly with (ii) the emergence of an insulating state in Mott systems, even without recourse to strong correlation. This requires using in band theory non -averaging (super) cells. Conversely, when temperature (or pressure, or doping) diminishes such local symmetry breaking modes, the source of gaping is removed, leading to the rise of the metallic state. This opens novel opportunities for experimental testing of the role of local, lattice motifs.

The Seminar will be held on Monday
25 April 2022, at 11:00
Flekser Hall 118, Kaplun Building
Tel Aviv University, Ramat-Aviv

הסמינר יתקיים ביום שני
25 באפריל 2022, בשעה 11:00
אולם פקלסר 118, בניין קפלון
אוניברסיטת תל-אביב, רמת-אביב

Light refreshments will be served before the seminar | כיבוד קל יוגש לפני הסמינר