

## Bulletin of the American Physical Society

### APS March Meeting 2019

Monday–Friday, March 4–8, 2019; Boston, Massachusetts

#### **Session C09: Superconductivity: Copper Oxide - Theory**

2:30 PM–5:30 PM, Monday, March 4, 2019

BCEC Room: 151A

Sponsoring Unit: DCMF

Chair: Michael Sentef, Max Planck Institute for the Structure and Dynamics of Matter

#### **Abstract: C09.00013 : Continuing search for the origin of HTSC: DFT studies of selected copper oxide proxy structures reviewed and paths forward suggested**

4:54 PM–5:06 PM

← Abstract →

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In this presentation, we review our past attempts to uncover the pairing mechanism underlying high temperature superconductivity in copper oxide compounds and suggest possible paths forward.<sup>1, 2</sup> One such path would be to derive and generalize pairing coupling functions to apply to DFT + U computed eigenstates in order to estimate Cooper pair coupling strengths arising from a combination of both lattice and spin excitations. Interestingly, such interactions were found in transition metal alums some 78 years ago as manifested in linking their respective Debye and Curie temperatures.<sup>3</sup> We suggest repeating such experiments today on the copper oxide compounds as a function of hole/electron concentration, along with a possible computational strategy to pursue in the interpretation of the results<sup>4</sup> to finally resolve the fundamental origin of high temperature superconductivity.

<sup>1</sup> Paul Grant, <http://meetings.aps.org/link/BAPS.2016.MAR.R25.8>

<sup>2</sup> P.M. Grant, Journal of Physics: Conference Series 129 (2008) 012042, doi:10.1088/1742-6596/129/1/012042

<sup>3</sup> C. Starr, Phys. Rev. 60, 241 (1941)

<sup>4</sup> Paul Grant, <https://meetings.aps.org/Meeting/FWS17/Session/B2.10>