

Abstract Submitted  
for the MAR15 Meeting of  
The American Physical Society

**Phase fluctuation in overdoped cuprates? Superconducting dome due to Mott-ness of the tightly bound preformed pairs<sup>1</sup>** WEI KU, Brookhaven National Laboratory, FAN YANG, Beijing Institute of Technology, China — In contrast to the current lore, we demonstrate that even the overdoped cuprates suffer from superconducting phase fluctuation in the strong binding limit. Specifically, the Mott-ness of the underlying doped holes dictates naturally a generic optimal doping around 15% and nearly complete loss of phase coherence around 25%, giving rise to a dome shape of superconducting transition temperature in excellent agreement with experimental observations of the cuprates. We verify this effect with a simple estimation using Gutzwiller approximation of the preformed pairs, obtained through variational Monte Carlo calculation. This realization suggests strongly the interesting possibility that the high-temperature superconductivity in the cuprates might be mostly described by Bose-Einstein condensation, without crossing over to amplitude fluctuating Cooper pairs.

<sup>1</sup>supported by Department of Energy, Office of Basic Energy Science DE-AC02-98CH10886

Wei Ku  
Brookhaven National Laboratory

Date submitted: 14 Nov 2014

Electronic form version 1.4