

Abstract Submitted  
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**Disorder-induced Missing Moment of Inertia in Solid  $^4\text{He}$** <sup>1</sup> JIAN-SHENG WU, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign — A microscopic model for the experimentally observed missing moment of inertia in the torsional oscillator experiments on partially-annealed solid  $^4\text{He}$  is proposed. We argue that an ordered array of  $^4\text{He}$  atoms is a Mott insulator. Disorder destroys the Mott state producing localized states in the gap which beyond a critical value of the disorder induce a superfluid state. Depending on the magnitude of the disorder, we find that the destruction of the Mott state takes place for  $d \leq 3$  either through a Bose glass phase (strong disorder and weak disorder) or through a direct transition to a superfluid (intermediate disorder). The critical value of the disorder that separates three region of disorder is shown to be a function of the boson filling, interaction and the momentum cut off. We apply our work to the experimentally observed enhancement  $^3\text{He}$  impurities has on the onset temperature for the missing moment of inertia. We find quantitative agreement with experimental trends.

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