

Abstract Submitted  
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**Role of Finite Size in Triggering Excess Heat: Why Nanoscale PdD Crystals Turn on Faster** SCOTT CHUBB, Research Systems Inc, 9822 Pebble Weigh Ct., Burke, VA 22015 — Two persistent questions have been: 1. Why is a finite triggering time required after the near full-loading condition ( $\text{PdD}_x$ ,  $0.85 \approx x \rightarrow 1$ ) before the Excess Heat effect<sup>1</sup> is observed? 2. Is it possible to identify physical properties of the materials and/or crystals that are used that might be playing a role in the length of the interval of time associated with this phenomenon? In the talk, through a generalization<sup>2</sup> of conventional energy band theory, as it applies to infinitely-repeating, periodic lattices to situations involving finite lattices, I have been able to address both questions. In particular, the tunneling time depends on crystal size. Crystals with dimensions  $\approx < 6$  nm, which have tunneling times  $\approx$  microseconds, either can not provide enough momentum to initiate  $d+d \rightarrow {}^4\text{He}$  reactions or conduct ion charge so rapidly that collisions occur. Crystals with dimensions  $\approx 60$  nm create heat and load rapidly ( $\approx 3$  ms). But crystals with dimensions  $> \approx 60$  microns have tunneling times that are longer than a month.

<sup>1</sup>C.G. Beaudette, Excess Heat: Why Cold Fusion Research Prevailed. (Oak Grove Press, Bristol, ME, 2002)

<sup>2</sup>S.R. Chubb, “Role of Broken Gauge Symmetry on Conduction of Charged and Neutral Particles in Finite Lattices,” submitted to Proc Roy. Soc Series A (2005).

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