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Thermal signatures of pairing correlations in nuclei and nanoparticles L. FANG, S. SCHMIDT, Y. ALHASSID, Yale University — Pairing correlations in nuclei at zero temperature are well documented but much less is known about their thermal signatures. Nuclei are in the crossover regime between the bulk BCS limit and the fluctuation-dominated regime. We have used the shell model Monte Carlo approach to study pairing correlations at finite temperature beyond the BCS limit. We identify signatures of pairing correlations in both the heat capacity and moment of inertia [1]. These signatures depend on the particle- number parity of protons and neutrons. Ultra-small metallic grains (nanoparticles) whose linear size is below a few nanometers are also close to the fluctuation-dominated regime. We use auxiliary-field Monte Carlo methods to study pairing correlations in such nanoparticles and find odd-even effects in their heat capacity and spin susceptibility, in analogy to the signatures found in nuclei. This work was supported in part by the U.S. DOE grant No. DE-FG-0291-ER-40608. [1] Y. Alhassid, G.F. Bertsch, L. Fang, and S. Liu, Phys. Rev. C **72**, 064326 (2005).

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