

Abstract Submitted  
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**Theory of Small Para-Hydrogen Clusters: Magic Numbers and Superfluid Sizes**<sup>1</sup> SAAD KHAIRALLAH, Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA, MIKHAIL SEVRYUK, Institute of Energy Problems of Chemical Physics RAS, Moscow 119334, Russia, DAVID CEPERLEY, NCSA and Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801, USA, PETER TOENNIES, Max-Planck-Institut für Dynamik und Selbstorganisation, D-37073 Göttingen, Germany — We apply the Path Integral Monte Carlo method to study the low temperature structures and superfluidity of parahydrogen clusters with up to 40 molecules. We find an enhanced stability at certain “magic” cluster sizes and sharp jumps in superfluidity for specific cluster sizes ( $N > 26$ ). Superfluidity is largely localized on the surface and coexists with clusters with solid-like core.

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