

# **Intrinsic Quantum Thermodynamics: Application to Hydrogen Storage on a Carbon Nanotube and Theoretical Consideration of Non-Work Interactions**

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Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

In

Mechanical Engineering

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Dr. Gian Paolo Beretta  
Dr. Michael W. Ellis  
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Blacksburg, Virginia

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