Contribution ID: **8** Type: **Oral Presentation**

Enhancing the understanding of entropy through computation

Friday, 15 July 2011 11:00 (15 minutes)

<p>We devise a hierarchy of computational algorithms to enumerate the microstates of a system comprising N independent, distinguishable particles. An important challenge is to cope with integers that increase exponentially with system size, and which very quickly become too large to be addressed by the computer. A related problem is that the computational time for the most obvious brute-force method scales exponentially with the system size which makes it difficult to study the system in the large N limit. Our methods address these issues in a systematic and hierarchical manner. We apply our methods to a simple model with single particle energy spectrum given by $\varepsilon(p, q) = \varepsilon0 (p2 + q 4)$, where p and q are non-negative integers. However, our methods are very general and applicable to a wide class of problems. Working within the microcanonical ensemble, our methods enable one to directly monitor the approach to the thermodynamic limit ($N \longrightarrow \infty$), and in so doing, the equivalence with the canonical ensemble is made more manifest. Various thermodynamic quantities as a function of N may be computed using our methods; in this paper, we focus on the entropy, the chemical potential and the temperature.

Level (Hons, MSc,
   PhD, other)?

other

Consider for a student
   award (Yes / No)?

no

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

no

Primary author: Dr SALAGARAM, Trisha (University of Pretoria)

Co-author: Prof. CHETTY, Nithaya (University of Pretoria)

Presenter: Dr SALAGARAM, Trisha (University of Pretoria)

Session Classification: Theoretical

Track Classification: Track G - Theoretical and Computational Physics