Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Algorithmic Refinements for Multicanonical System Measurements DAVID YEVICK, TAO LU, DEREK DUMAS, MICHAEL REIMER, WITOLD BARDYSZEWSKI, BRETT HAMILTON, University of Waterloo — We have adapted, to our knowledge for the first time, multicanonical sampling and its Wang-Landau extension to the analysis of the statistics of communication systems, and by extension, arbitrary stochastic physical systems.[D. Yevick, "A First Course in Computational Physics and Object Oriented Programming with C++", Cambridge University Press, Ch. 22 and references] Subsequently, we applied the technique experimentally with and without a novel biasing procedure for the intermediate pdf distributions that significantly enhances the statistics in selected regions of system variables. [T. Lu, D. Yevick et. al., IEEE Photon. Technol. Lett, **17**, 1420 (2005) and to be published]. Here we additionally discuss procedures that (1) bias the statistical samples by raising the estimated pdf to a power (2) combine intermediate results in a manner identical to that employed in importance sampling (3) incorporate non-uniform Markov chain displacements and (4) interpolate the histogram and pdf values during iterations. These significantly impact experiments with a restricted number of samples.[D. Yevick et. al., submitted to J. Opt. Soc. Am. A]

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Date submitted: 09 Jan 2006 Electronic form version 1.4