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Maximum Entropy Principle for the Microcanonical Ensemble DONALD KOBE, MICHELE CAMPISI, University of North Texas — We derive the microcanonical ensemble from the Maximum Entropy Principle using the phase space volume entropy of Gibbs. Maximizing (or extremizing) the entropy with respect to a general probability distribution and using the constraints of normalization and average energy, we obtain the condition that the energy is a constant E that characterizes the microcanonical ensemble. We justify the phase space volume entropy of Gibbs by showing that the combined first and second laws of thermodynamics is satified, a condition that Boltzmann called orthodicity. We also show that the entropy calculated from the Tsallis q-escort probability distribution approaches the phase space volume entropy in the limit as q approaches minus infinity. Our approach is in contrast to the commonly accepted derivation of the microcanonical ensemble from the Maximum Entropy Principle that assumes a priori that the energy E is a constant. Then the Shannon information theory entropy with only the constraint of normalization gives Laplace's Principle of Insufficient Reason for the states with the constant energy E.

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