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The Kelvin Poincare Counterexample to the Equipartition Theorem JAMES ESPINOSA, Texas AM University San Antonio — The statistical interpretation of the second law of thermodynamics was first introduced independently by Maxwell and Boltzmann. One of the results that follows from their probabilistic approach is the equipartition theorem which was stated by Maxwell in 1878 in the following words: "In the ultimate state of the system, the average kinetic energy of the two given portions of the system must be in the ratio of the number of degrees of freedom of those portions".[1] Lord Kelvin never accepted this statistical basis for thermodynamics and published a short note describing a simple mechanical system that violated this theorem and therefore cast doubt on the use of probability to derive thermodynamics. Poincare proved that Kelvin's system did in fact obey the equipartition law but gave a simple modification to make the test case a perfect counterexample, which indicates that physicists loyal to Newtonian mechanics already knew that the equipartition theorem was doomed before its comparison with experiment. We will discuss the simple mechanical model and present Poincare's analysis of it. [1]"On the Average Distribution of Energy in a System of Material Points", *Cambridge Philosophical Society Transactions* (1878).

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