Assistance is kindly requested in solving a challenging problem in physics.

Dear Professor XXX,

I hope this email finds you well. I am writing to kindly request your assistance in solving a challenging problem in physics. This problem has been submitted to over 5,000 professors from renowned universities, with each letter carefully prepared, yet no one has provided a concrete answer to the substance of the problem so far. As for the doubts raised about whether the experiment mentioned in Note.2 has reached final equilibrium, my response can be found in Note.3.

The background of the problem is, in 1910, physicist R.C. Tolman measured the potential difference in electrolytes under accelerated force fields. His study revealed that an electric potential develops along the direction of acceleration, with different electrolytes exhibiting varying potential differences. We have used the Boltzmann distribution to arrive at the same conclusions and explain the experimental observation that the voltage values in Tolman's experiment are independent of electrolyte concentration. Furthermore, from a theoretical perspective, we deduce that when the voltage falls below the value obtained by Tolman, thermal vibration energy drives charged particles to diffuse and move against the electric field, thereby converting thermal energy into electrical energy. Based on long-term measurement results, this voltage can stably exist while outputting current.

To simplify the scenario and minimize variables for clearer discussion, consider the following thought experiment:
1. Suppose we construct a “gravitational battery” based on Tolman's concept. Two electrolyte solutions—potassium iodide and lithium iodide—are placed side by side, with their bottoms electrically connected. As per Tolman's findings and our additional experiments, this static system develops a stable potential difference between the upper ends of the two solutions under Earth's gravitational field.
2. We now electrically connect a resistor or battery located in a higher-temperature region to this gravitational battery. This configuration produces a stable electric current, transferring energy from the cooler electrolyte region to the hotter resistor or battery.
3. Throughout this process, the system remains stationary, and the concentration and electric field within the electrolyte solutions remain stable. Hence, Earth's gravity performs no work on the system over time.
4. Assume further that the entire simplified system neither performs mechanical

work on its surroundings nor exchanges heat with the external environment. The only energy transfer occurring is electrical—moving from the gravitational battery in the low-temperature region to the resistor or battery in the high-temperature region.

5. Based on the fundamental definition of entropy, $\Delta S = Q / T$, the second law of thermodynamics states that energy Q must flow from high-temperature regions (where T is large and ΔS is small) to low-temperature regions (where T is small and ΔS is large), resulting in net entropy increase. However, in our scenario, energy Q is instead transferred from the colder electrolyte (with smaller T and thus larger ΔS) to the warmer resistor or battery (with larger T and smaller ΔS), making the outgoing entropy greater than the incoming entropy—effectively reducing the total entropy of the system.

This leads to a puzzling question: If, according to the second law of thermodynamics, entropy must always increase, then where did the 'missing' entropy go in this simplified system?

I sincerely hope to receive your response, and thank you for taking the time to read this letter despite your busy schedule.

Best regards,

Kuo-Tso Chen

Note.1. For more on the mechanism of converting thermal energy into electrical energy, please refer to the video below.
https://youtu.be/3J8gOVRiWXo

Note.2. The theoretical inferences and measurement results are documented on the VIXRA.ORG preprint platform, accessible via the following links (three versions):
https://vixra.org/abs/2412.0035

Note.3. Below is my response regarding whether the experiment has reached equilibrium:

A professor responded that the system should be analyzed using Gibbs free energy for each individual part, and speculated that my experiment may not have reached complete equilibrium yet. He also asserted that once equilibrium is achieved, the current is expected to stop.

Until I receive the professor's permission, I do not have the right to share the original

message. Below is my response to the professor:
"Thank you very much for taking the time to consider and reply to my message. Regardless of whether you respond further, I truly appreciate your thoughtful engagement and response.
Perhaps your hypothesis is correct — the long-term power output I have observed may indeed result from the system not yet having reached its final equilibrium, as you suggested. Even though I have continuously measured power output from samples left discharging under power output conditions for nearly two years, it is possible that full equilibrium might require hundreds of years to achieve.
I have previously estimated, based on the natural diffusion coefficients of ions, that if the power output were solely due to ion redistribution, the expected half-life (the time required for the output power to decrease to 50% of its initial value) of the output should be between 12 to 36 hours — not several months or years, which is the timescale I am currently observing.
Perhaps, as you suggested, there may indeed be some chemical reactions involved. However, I used platinum-coated titanium electrodes precisely because, after consulting with many experts, they were considered among the least likely to undergo chemical reactions with the solution. Of course, I cannot be 100% certain that platinum is entirely inert in this context, but I have made every effort to minimize the possibility.
However, I suspect we may now be entering the territory of belief. You believe that the second law of thermodynamics cannot be violated, while I believe that there might be exceptions — not that the second law is wrong, but that exceptions may occur in cases where gravity and charged particles of differing mass coexist. Yet belief alone cannot resolve this question. It will take further evidence to determine which view is correct.
What I hope for is the opportunity to carry out more advanced theoretical or experimental investigations — to test whether, as you suggest, the system will ultimately reach equilibrium, or whether the process of converting thermal energy into electricity can continue indefinitely, as I suspect.
I believe this issue may also carry an important implication: it could potentially open up a new pathway for energy conversion and green energy development.
If you could recommend anyone or any organization that might be interested in pursuing further experiments, I would be deeply grateful."
