

# **A judgment experimental design about the basic principles of Newtonian mechanics and the second law of thermodynamics**

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**Abstract:** This paper describes an experimental design similar to “Maxwell’s demon”. Compared with the “Maxwell’s demon” scheme, the proposed experiment does not need intelligence that is necessary for “Maxwell’s demon” when working. Moreover, the program is not an ideal experiment only performed in thought. It can be implemented realistically. The design fully follows the basic principles of Newtonian mechanics but contradicts the second law of thermodynamics. The experimental design suggests that there is a logical contradiction between the basic principles of Newtonian mechanics and the second law of thermodynamics.

**Key words:** Maxwell’s demon, The basic principles of Newtonian mechanics, The Second Law of Thermodynamics, Logical contradiction.

**PACS:** 05.20.-Y, 05.20.Dd, 05.65.+B

## **INTRODUCTION**

Since Boltzmann built up a bridge between the Newtonian mechanics and thermodynamics, the thermodynamics has been attribute to the Newtonian mechanics. After hundreds of years, people have become accustomed to thinking: the Newtonian mechanics and the second law of thermodynamics are logically self-consistent.

However, is it really always logically self-consistent between Newtonian mechanics and the second law of thermodynamics?

On the question, Maxwell cast doubt. In order to discuss the logical contradictions that may exist between the two, Maxwell designed “Maxwell’s demon” – a famous thought experiment. However, this “demon” need to work based on the information of molecular motion. Getting information needs additional energy consumption. According to the modern point of view, Maxwell ideal experimental design does not constitute a challenge to the second law of thermodynamics and cannot be used as evidence that there is a logical contradiction between the basic principles of Newtonian mechanics and the second law of thermodynamics.

Recent studies found: there is an experimental design which do not need that kind of intelligence of the “demon”. In the design, the conclusion that there is a logical contradiction between the basic principles of Newtonian mechanics and the second law of thermodynamics can be derived. The program constitute a judgment experiment on – “Basic principles of Newtonian mechanics is correct or second law of thermodynamics is correct?” It has important theoretical and practical significance.

If the judgment result of this experiment is that the basic principles of Newtonian mechanics is higher than the truth of the second law of thermodynamics, then the design itself constitutes the first human long-awaited successful perpetual motion machine of the second kind. Else if the judgment result of the experiment is that the truth of the second law of thermodynamics is higher than the basic principles of Newtonian mechanics, then the field of physics concepts will have a huge change.

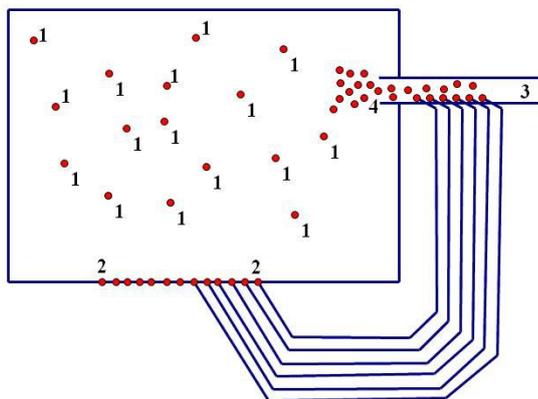
No matter how the final results, theoretical studies and research on the implementation details of the program require vigorously promotion.

## 1. Experimental Design

As we all know-

1. The ball injected into one end of the U-shaped pipe can be emitted from the other end. Ignoring friction losses, ball momentum diminished;
2. Photons incident on one end of the fiber can be emitted from the other end with the same frequency (energy unabated);
3. As analogy, if there is a narrow tube, molecules can be injected into the narrow tube and emit from the other end. (Kinetic energy unabated. In theory, only a Narrow tube close to the ideal rigid body is need).

Then, when the tube is sufficiently narrow (such as carbon nanotubes) and only allows a fluid with size of one molecule to enter, as shown in the figure.



In the initial state, for a fluid molecule 1 theoretically has the same probability to enter either end of all the narrow tubes 2 and flow out system cannot generate macro kinetic energy.

However, if applying an initial start-up process to the system, the system will constantly produce macroscopic kinetic energy (jet) from a single heat source. After the boot process, the system is put in the working status that can be self-sustaining.

Boot process can be: Pumping the fluid molecules into the main chamber from confluence-tube spout until the formation of the macro jet.

We can choose single atom of inert argon gas molecules as “working fluid” and carbon nanotubes with rigidity comparable to that of diamond as Narrow tubes (Tsinghua University has already could make carbon nanotubes with half a meter). Therefore, the experimental design is not an “ideal experiment” like “Maxwell’s demon”, but can be actually carried out.

## 2. A proof that the "jet" can be self-sustaining , based on the principles of Newtonian mechanics

2.1 A "biased collision off-axis theorem" proof and consequence.

**Definition 1:** For any one of the molecule A, before collision, centroid drift motion path is called "axis (of molecules A)". The forward direction of the molecule A is called "axial direction (of the molecule A)";

**Definition 2:** Molecule A, along the axis of molecules A, collided with another molecule B. When their centroid-connection is in the axis of the molecule A, the collision is called that the molecular A is "positive collided" by molecular B. Any other collisions are called "biased collision".

**Theorem:** When any molecules A are biased collided by another molecule B, both molecules A and B will deviate from the axis of molecule A.

Proof of the theorem as follow:

∴ When biased colliding, two molecules centroid-connection is not on the axis of molecules A;

∴ When biased colliding, the impulse "f\*t" of two molecules interacting outside of the direction of the axis of the molecule A is not zero;

∴ After the biased collision, both two molecules A and B, will deviate from the axis of molecule A.

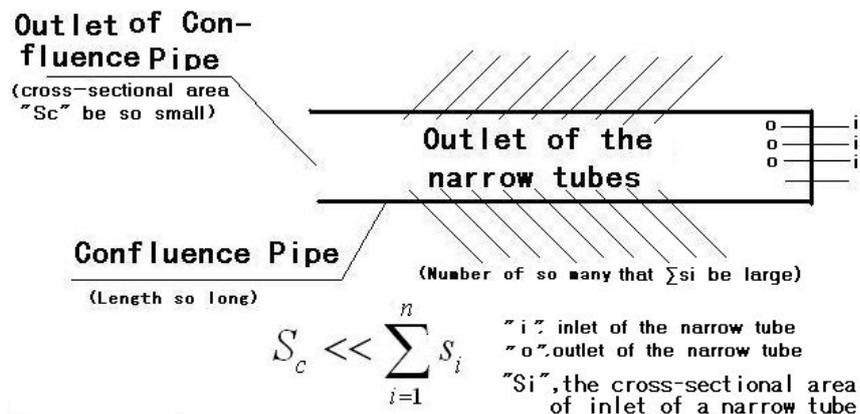
QED.

**Consequence:** Because biased collision has much greater probability to happen than positive collision, nearly all the molecules out of the narrow biased collision making two molecules deviate from the direction of axis when flowing out of narrow tubes. In addition, they have no chance to return into the narrow tubes. Therefore, after the startup, the probability of molecules going into a narrow tube from its two port can be locked in an unbalanced state.

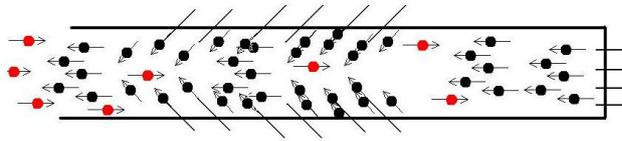
### 2.2 The significance that Confluence Pipe is locked at imbalance

Inside the "Confluence Pipe" as shown, the outlet of the narrow tube is set trying keeping the consistency of outlet direction of Confluence Pipe and narrow pipe. Therefore, when the ratio of length to diameter of Confluence Pipe is large enough, the followed conditions can be achieved.

1. The cross-sectional area of the Confluence Pipe outlet "Sc" is far smaller than the sum of all cross-sectional area of the narrow tubes outlet "So" .



2. In nearly all states, collisions of all molecules that come out of narrow tubes and enter Confluence Pipe will happen among themselves.
3. Based on the condition 2, for both the colliding molecules have momentum component pointing to the direction of outlet of Confluence Pipe, the kind of collision will not make molecules return into the narrow tube.
4. Based on the condition 3, a high density of gas in Confluence Pipe is allowed. In addition, the negative pressure difference blocking “automatic flow” cannot form.
5. Based on the conditions 1 to 4, it is a jet that is directional and high-density molecular flow out of the Confluence Pipe. A large number of biased collision make the chance that molecules return into Confluence Pipe little.



6. That is, once the system generates “Auto Flow”, the “Auto Flow” will not stop.
7. Particularly interesting, if you set an impeller near the outlet of Confluence Pipe making the jet acting on the impeller. After doing work, the average kinetic energy of molecules decreases. The low kinetic energy molecules concentrate relatively near the Confluence Pipe outlet forming a relatively low temperature region. In theory, a common heat engine can work with conditions that it did not have initially.
8. When the jet acting on the impeller, the impeller drives generator. The energy outputs out of the system. The system temperature decreases, so that it can absorb heat from the environment.

Means: the system which works in accordance with the basic principles of Newtonian mechanics, due to “self-organization” function of the narrow tubes and the Confluence Pipe, can constantly absorb heat from the environment. The energy of random motion of molecules can be transferred into macroscopic kinetic energy (constitute perpetuum mobile of the second kind). Obviously, this is a direct violation of the second law of thermodynamics.

### 3 Conclusion

The experimental design reveals the existence of a logical contradiction between the basic principles of Newtonian mechanics and the second law of thermodynamics.

### References

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