

# Extracting Energy from Brownian Motion

## *Brownian Motion Interference*

(For the diagrams of the devices discussed in this paper, see <http://olsonb.com>)

A previous attempt at extracting energy from Brownian Motion was the Brownian Ratchet, researched by famous physicist Richard Feynman. The ratchet failed since particles hit the pawl (latch) which made the ratchet erratic and bounce back and forth. In the Olson thought experiments, no pawl is needed to separate hot and cold since vibrations are exploited without any ratchet device. Separating hot from cold is the primary concern in the Olson devices rather than directed motion. Static discharges of electricity or eddy currents (creating heat) or viscosity (liquid friction) is used in the Olson thought experiments to separate hot from cold. How does one extract energy from the devices? Once one separates hot from cold he can extract energy later – the primary concern is to separate hot and cold first, not to obtain ordered motion in a ratchet like device.

The Brownian Ratchet tried to force Brownian motion into one directional movement in a system where particles were everywhere (hitting the pawl). The Olson systems are engineered without pawls and are like regenerative nano brakes. They dissipate heat or generate random electrical charges which could be stored later in a capacitor, all without any cold sink. A cold sink is emulated by taking advantage of non equilibrium properties such as viscosity differential and electrostatic electron affinity differential.

In order to extract heat one needs a sink. When molecules collide with a resistive slow object it is similar to colliding with a cold particle. Instead of using cold particles as a sink, the Olson thought experiments use a microscopic or nanoscopic object which experiences external drag, which emulates a continual cold (slow) particle without it actually being a cold particle. This would violate the second law if they are verified to work without a cold sink. Using a brake or resistance in the system is less costly than using actual cold particles since cooling particles costs energy, but putting drag on an item is free (brake systems in cars are virtually free, which is why someone discovered regenerative braking.. the Olson thought experiments and discoveries propose regenerative nano particle braking using a mobile nano magnet forced to move by random Brownian motion). Brakes decelerate an object in motion as long as the object comes near a surface at some point in time that interacts with it (slows it down or resists its motion).

In the Olson thought experiments, nano magnets are jarred and vibrated by a fluid due to Brownian motion, but those magnets interact with a contact surface they pass by (or vibrate near), causing drag in many directions due to the field interactions (i.e. eddy currents, or static electricity generation outside the container via a connected nano magnet). The nano magnet can vibrate in many directions, not just one direction like in the Brownian Ratchet.

Brownian motion is random, like a random drummer hitting his drum set without any concern for musical order. It is currently thought that random brownian motion is not useful energy since it is so chaotic and random. However a physicist would never argue that no electricity can be produced from a drummer just because that drummer hits his drums completely randomly and chaotically. A piezo pad still produces erratic electric current regardless of whether the collisions from the sticks are erratic and random. A microphone or piezo needs to be strategically placed near a drum surface in order to capture any of the random sound – but even if those piezo's are placed randomly on drum heads – as long as they are on a surface that has a probability of interaction, they will steal electricity from kinetic motion of a drum stick.

Brownian motion particle collisions are very much like random unordered drumming: collisions will occur, even if the drummer misses the drums some of the time. Therefore logically we can place a microscopic object strategically in a molecular fluid like water, at room temperature, to capture random molecule movement and slow down those molecules, just like one can strategically place a piezo on a drum surface where there is some probability of interaction with the surface. The more constrained the room the drums are in, or the larger each drum surface, the more likely there will be a collision.

Many of the Olson discoveries and thought experiments function based on induction. Piezo pads are just used as an analogy in this paper. Induction (magnet moving near metal) is far more useful than a nano piezo pad, since piezo pads require a collision, whereas induction functions when there is a magnet just within a range or vicinity of a surface.

No one ever before thought of a successful way how to use room temperature as energy, putting in to question the second law of thermodynamics while fully obeying conservation of energy (the energy in substances all around us at room temperature, ultimately comes from the sun – that is why energy is conserved in the Olson particle decelerators). Lakes are batteries absorbing sun. The sun keeps water in lakes at room temperature by charging it with brownian motion all day long. If the 2<sup>nd</sup> law of thermodynamics were ever falsified, one would be able to drain room temperature from substances if one were able to extract energy from Brownian motion, since Brownian motion exists all around us in fluids.

The second law of thermodynamics is statistical and geared toward macroscopic systems, whereas Olson is exploiting nanoscopic or microscopic fluctuations.

An object that has kinetic speed can be slowed down and that kinetic energy can be converted to other energy. No one before thought of “braking” a fluid’s internal movement by interfering directly with molecules without the need for complicated ratchets or pawls.

Current physics books state we cannot make use of internal energy of substances even though that internal energy is microscopic kinetic energy, which is similar to macroscopic kinetic energy.

While the Olson brownian static generators produce electricity, the eddy decelerators just produce cooling and heating. i.e. the devices proposed by Olson are refrigerators without requiring energy to be expended. It sounds crackpot, and would need to be verified to work – however it is worth trying to verify these devices in order to stop global warming and try to falsify the second law of thermodynamics. After all science is about falsifying our current claims.

The Olson decelerators laid out in this paper are vibration dampeners which do not require gear rotation, rods, nor actual physical springs. This makes the designs much simpler than the Brownian ratchet. In some of the eddy dampeners (decelerators), magnetic fields are used as invisible springs instead of actual springs. The designs are very simple and easy to disprove or verify. Can you falsify the Olson thought experiments or disprove them?

If it is falsified, it is a wonderful thought experiment similar to the Brownian Ratchet but the designs are simpler.

If it is not falsified, it is one of **the most important physical discovery this century** since global cooling is possible (reversing global warming). It would also mean that the second law of thermodynamics holds true for macroscopic systems, but may be broken in nanoscopic systems.

## How To Create a Room Temperature Heat Sink

How does one emulate a cold particle or create regenerative molecule braking in fluid? The answer is to **interfere with Brownian motion** and transfer random jarring over to

1. a nanomagnet that moves and causes eddy currents in metal, which cause random hot spots. The metal is thermally insulated to isolate concerns, and can be aluminum or diamagnetic like copper... or...
  2. a nanomagnet that moves, connected to another magnet that responds to the movement and causes static electricity causing random discharges. The responding magnet is plastic coated (electron theft) which vibrates and moves on wool (electron donor) or similar material, isolated from the other part of the system where the Brownian motion occurs... or..
  3. a nanomagnet that moves, connected to another magnet causing random friction spots, creating random hot spots on a friction pad isolated from the Brownian motion liquid..or..
  4. a nanomagnet that moves, connected to another magnet in an isolated viscous solution causing continual drag due to liquid friction (viscosity) producing random hot spots only in the isolated viscous solution.
- *(For diagrams of the devices that would exploit the above, see <http://olsonb.com>)*

Unifying kinetic macroscopic mechanical motion with molecular kinetic energy (temperature) is the outcome of the Olson Particle Decelerator thought experiments. The logic in the Olson Thought Experiments is that microscopic kinetic random particle motion is useful work, just as kinetic macroscopic mechanical random motion (such as chaotic unordered drumming) is useful work. A vibrating orbital sander, even if random, still produces hot spots on a surface it is in contact with, if that surface is isolated and the heat doesn't transfer right back to the orbital sander – so why can we not do this with Brownian motion objects? The problem has been a lack of creativity in the minds of scientists: magnetic fields, eddy currents, static electricity, and isolating concerns are the required creative components in the system never before thought of. It may be that microscopic or nanoscopic systems end up failing due to Johnson/Nyquist noise or other microscopic effects, but it is still worth trying to falsify the second law so that global cooling on demand could be possible.

Why didn't Feynman simply put a vacuum on one side of the Brownian ratchet, and particles on the other side to create a differential? Worse, Feynman's ratchet contains complex parts that are not needed. It's much easier to design complex systems that fail than it is to design a simple system that works. The Olson systems are simpler than the brownian ratchet, due to the Olson systems having no pawls or springs or gear teeth. If the Olson systems can be falsified, they will most easily be falsified by someone experienced in particle physics or nano technology. Simple devices are easy to falsify or verify. Complex ones like Brownian ratchets are not as easy to falsify and build.

The idea that random motion cannot be exploited as useful work hopefully could be put to rest. Kinetic molecular movement is still kinetic movement and the theory of kinetic molecular movement needs to be unified with ordinary mechanical kinetic movement, logically. How do we unify? We put a nano magnet into the fluid which vibrates just like a macroscopic object, but it is microscopic, and that magnetic field can interact with an external isolated item, since magnetic fields transmit through thin layers of insulation.

Can you find flaws in the Olson particle decelerators and nano technology thought experiments that would cause the devices to fail and not extract heat? If you know of a nano institution that could build it let me know. I am looking for physicists and nano experts to help falsify or verify the devices. Any help is much appreciated.

For the diagrams of the devices discussed in this paper, see <http://olsonb.com> PDF files and JPG/PNG images or the attached PDF files and PNG's with this document. Email: mail at olsonb dot com