Title - **DEFEATING THE 2ND LAW OF THERMODYNAMICS WITH QUANTUM-ENTANGLED BITS**

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abstract –
Disorder (entropy) increases over time. This is known as the 2nd law of thermodynamics. In the 1860s, physicist James Clerk Maxwell invented the hypothetical "Maxwell's Demon" - this classic thought experiment could break the law by sorting hot and cold gas particles without expending any energy. 150 years later, a research team in the USA has published a mathematical model envisioning a machine which really could decrease entropy without using energy. It would only need a supply of bits – the binary digits of 0 and 1 – with which to encode information about the particles. Such a machine may supply infinite energy in the future, according to team member Dibyendu Mandal. But it would require about 200 x 10^18 bytes to heat a gram of water by just a single degree Celsius – at present, an overwhelming demand on data storage. (from “Conquering a Demon” by Shannon Palus – Discover Magazine, March 2014, p.17). My vixra article seeks to show how to delete that overwhelming demand.

Content -
This article seeks to show how to delete that overwhelming demand and is about the chemical element helium but it relates He to the whole universe. As recently as a couple of years ago, hard drives required about a million atoms to store one bit. Nanotechnology is testing methods to store an electronic 1 or 0 using a cluster of 12 iron atoms or a molecule created from two uranium atoms. In this article, the first step suggests technology of the distant future will manipulate quarks to store 3 bytes in a single helium atom. The second step suggests helium is united with atoms of iron, uranium, etc. via the entanglement resulting from everything in time and the universe being produced by bits. An He atom has a potential information content, thanks to quantum entanglement, equal to the universe's (here, that data content is limited to the observable universe's and estimated as 3x10^80 bytes, enough to heat more than 10^62 grams of water by a degree Celsius). Since there were originally 8 bits in a byte, an alternative way of viewing a helium atom would be to regard it as being composed of eight times 3x10^80 bits or BInary digiTS (again underestimating the true data content since this value is based on the observable universe, and I believe the universe is actually infinite).

To introduce some thoughts of mine, I'll start by quoting a few lines from the article "Lilliputian Storage Wars" by Elizabeth Svoboda, in Discover magazine's May 2012 issue -

"... Andreas Heinrich, a nanotechnologist at IBM’s Almaden Research

Center ... coaxed a cluster of 12 iron atoms to store one bit of data, consisting of either a 1 or a 0. Today's hard drives require about a million atoms to store one bit. Heinrich did it by painstakingly using a microscope fitted with a tool to move the atoms into a formation. The arrangement induced each atom to take on a magnetic charge opposite that of its neighbor. This checkerboard configuration allowed far tighter packing than in current hard drives, where atoms of the same charge repel each other. Other contenders include German physicist Roland Wiesendanger, who is applying a similar technique to cobalt, and British chemist Stephen Liddle, who is testing a molecule he created from two uranium atoms."

Iron? Cobalt? Uranium? Let's go way beyond present technology and think about helium. In the first part of this example, we're going to ignore quantum mechanics and wave-particle duality. So let's just concentrate, for the moment, on their particle function and let's strip the electrons from the atom and imagine the 12 quarks comprising the nucleus's 2 protons and 2 neutrons. There are definite points where each quark either exists or doesn't exist. One day, even if it takes a million years or more, technology will be able to access these individual points. Then if a 1 corresponds to the presence of a quark and a 0 corresponds to the quark's absence, a helium nucleus will consist of 24 bits. Originally, there were 8 bits in a byte so a nucleus contains 3 bytes whereas IBM's hard drive requires 288 atoms to store 3 bytes.

Now let's consider wave-particle duality. In this scenario, any two waves could merge and no separation need exist between helium atoms and iron, cobalt, uranium, or any other atoms. According to "Atoms in the Universe" (Universe Today, 30-07-2009), there are about 10^80 atoms in the observable universe. For convenience, let's assume the entire universe consists only of helium (this is ridiculous assumption #1). Let's also assume the OBSERVABLE universe is, in fact, the ENTIRE universe (this is ridiculous assumption #2). Then the total information content of the universe would be 3x10^80 bytes. Since no separation need exist between any atoms, the potential data in just one helium atom would equal 3x10^80 bytes.

It might be helpful to present here a one-paragraph summary about cosmic wormholes and an infinite universe (since I stated near the beginning that I believe the universe is actually infinite)–

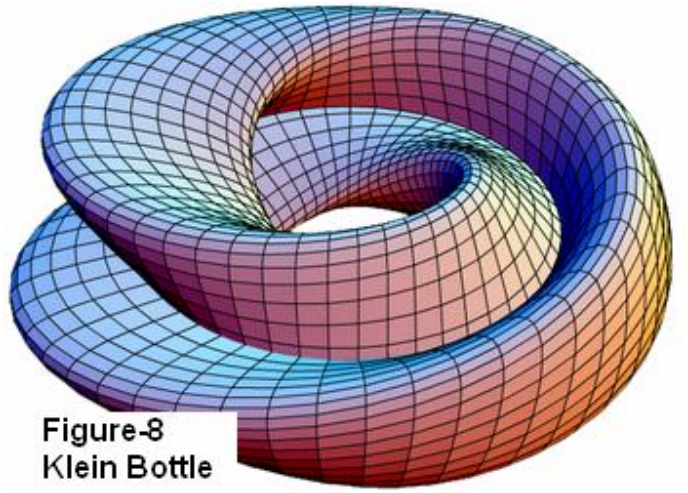

Figure-8
Klein Bottle

Mathematics' Poincare conjecture has implications for the universe's shape and says you cannot transform a doughnut shape into a sphere without ripping it. This can be viewed as subuniverses shaped like Figure-8 Klein Bottles (above; similar to doughnuts) gaining rips called wormholes when extended into the spherical spacetime that goes on forever, forming one infinite superuniverse. 2 Mobius loops are joined on their sides to form the Bottle, with binary digits – which form clockwise and anticlockwise "currents" in the Mobius loops of this "digital" version of physics' string theory - filling in the central gap and perfectly adjusting the outer edges to fit surrounding subuniverses [simplified, this is similar to manipulation of an image on a computer screen]. The digits encode infinite transcendental numbers into cosmic structure, as an infinite and eternal series of Klein bottles/subuniverses.

The previous article suggests the device of Dr. Mandal's team would, in fact, be the universe itself – and not just the present universe but all of its past and future selves (a multiverse of universes?) The "device" would be self-contained in the sense that no outside power source would be needed (or even possible). And there would be no restrictions on data storage – the supply of bits is literally endless.