The Lawson Criterion is A Red Herring

Why try to create a Sun on Earth when we can be a little bit more subtle?

Apparently this has been deprecated in favour of a Triple Point of Energy, Density and Time. Let's get this one wrong. The goal is to achieve conditions where output exceeds losses. Add in some corrections and build a big hammer.

Energy

The nucleons need to overcome coulomb repulsion in order to fuse.

Density

More nucleons to smack together.

Time

To allow for lots of smacks to occur.

I am being facetious when I say smack.

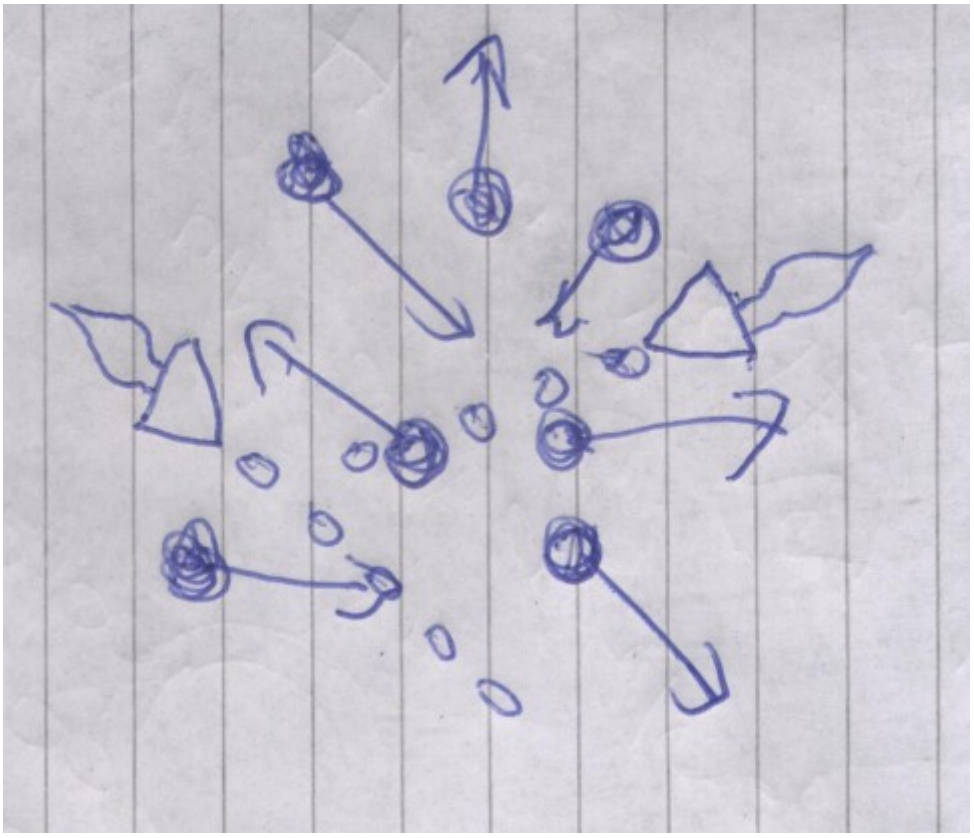
Also I do not understand Quantum.

In a Tokamak both nucleons and electrons are in a bulk raised to some average temperature with a Maxwell-Boltzmann energy profile such that some of them do have the energy to overcome coulomb repulsion moving in random directions so they do not wasting energy every time they fail. The electrons don't help either. It is a great big do nothing energy sink.

Stars can get away with that sort of stuff because they are big. We are not. Why not create a Ballet rather than a Mosh pit?

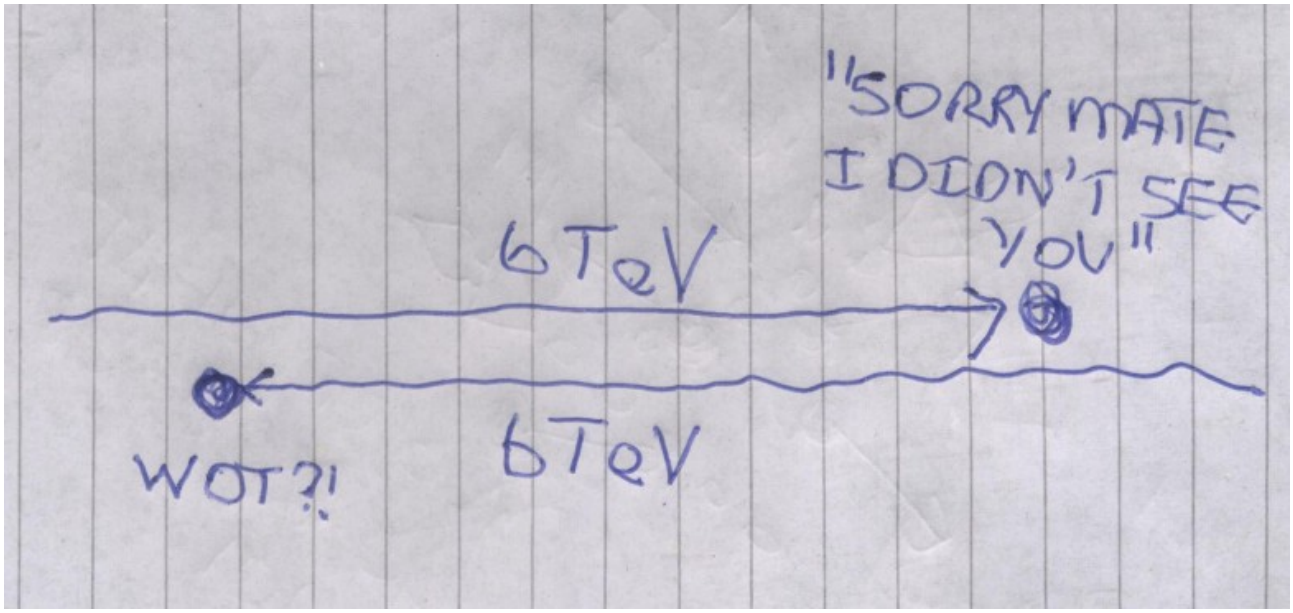
Ignoring Density and Time as being something to do with the many let's concentrate on energy as applied to a pair. The energy is kinetic. It also suffers from a direction so it is a velocity and a mass along with a momentum.

JET



Everything is in the mix largely moving about in random directions with equally random energies some of which might be sufficient to overcome the coulomb repulsion. Most interactions will fail to produce a fusion event and each failure wastes energy from the bulk. Basically it is a mess and they do not have a clue as to what is going on or where it might be happening.

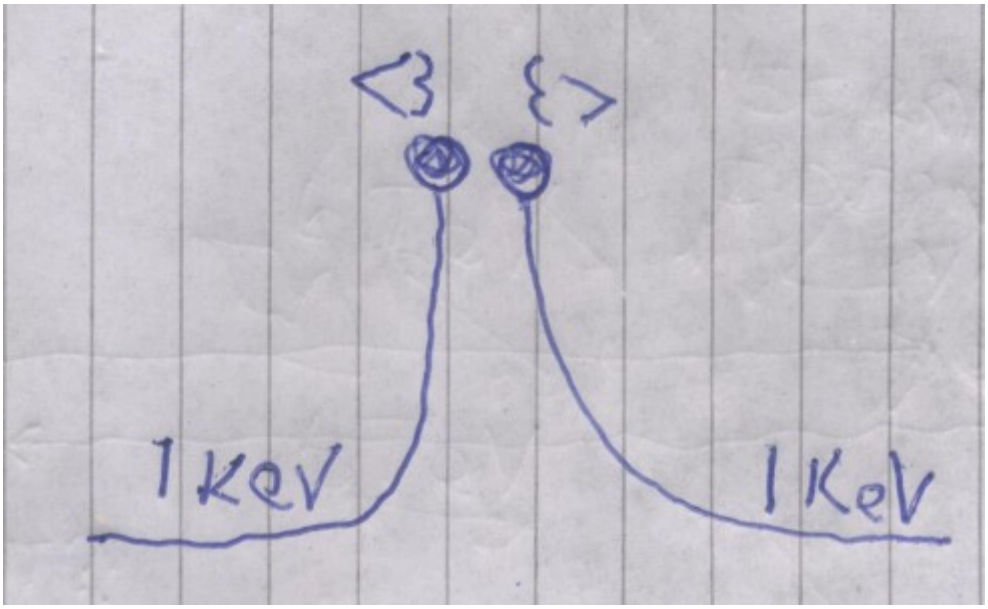
LHC



No. I get it Head on collisions do not occur. I don't know why this one was quoted at me along with some wrong sums to prove I am wrong. The nucleons have energy well in excess of that required for fusion. We want them to smack head on and convert it into other more interesting things.

They do not cooperate but perhaps we can make them?

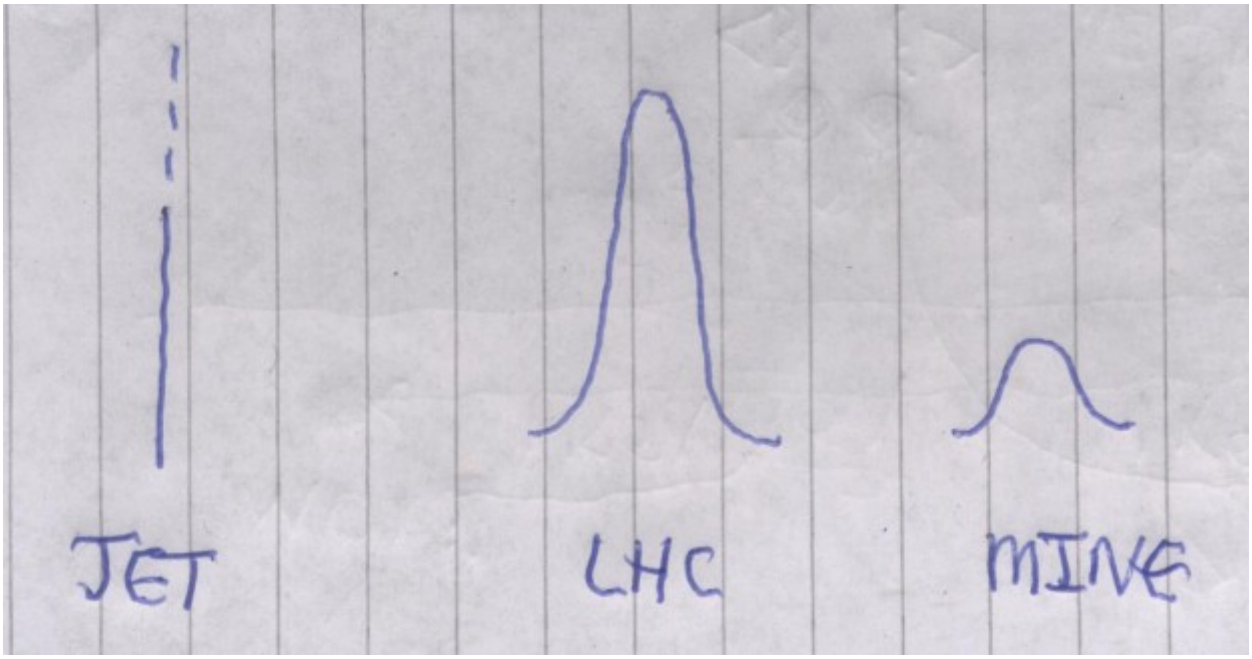
Proposed



The nucleons have just the right and well defined energy to overcome the coulomb repulsion, pick your own number. They undergo a lossless elastic collision. They Kiss, separate and are recovered back into the system. Again and unlike JET with minimal energy losses. Of course they might also fuse which would be nice.

Not only is the collision elastic but the trajectory maximises the time that the nucleons are in close proximity to each other. I will suggest that this raises the probability of fusion. There is a lot of this probability stuff going on. Why not work to enhance it as well as saving on housekeeping energy?

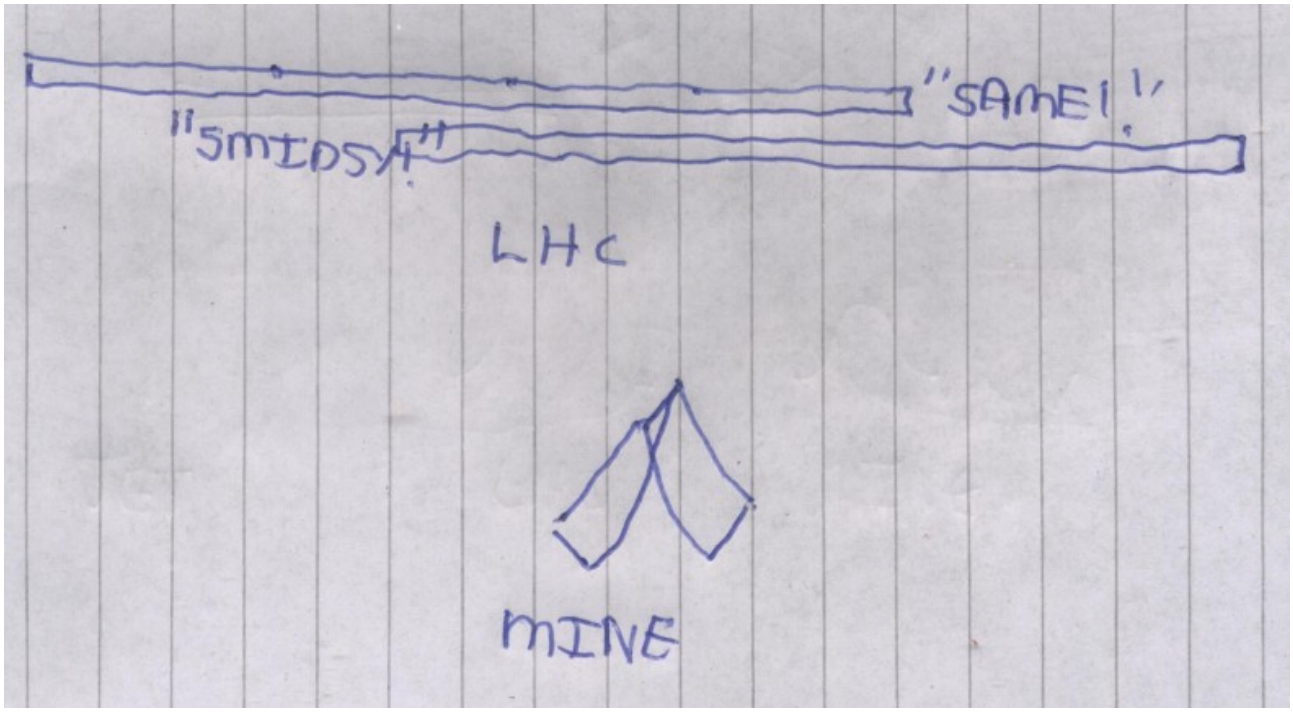
Nucleon Width



In JET linear, or other, accelerators might be used for nucleon, including putting the electrons back in, injection but once in the mix any sense of, momentum, coherence, is lost. It might however be regained in particular locations within the bulk. A cause of instabilities?

In the LHC everything marches in lockstep around the storage rings in bunches. Momentum is extremely coherent and as a result width, one dimension, is smeared out. The same applies to the system being described. Of course my philosophy about Heisenberg's Uncertainty Principal might be distorted.

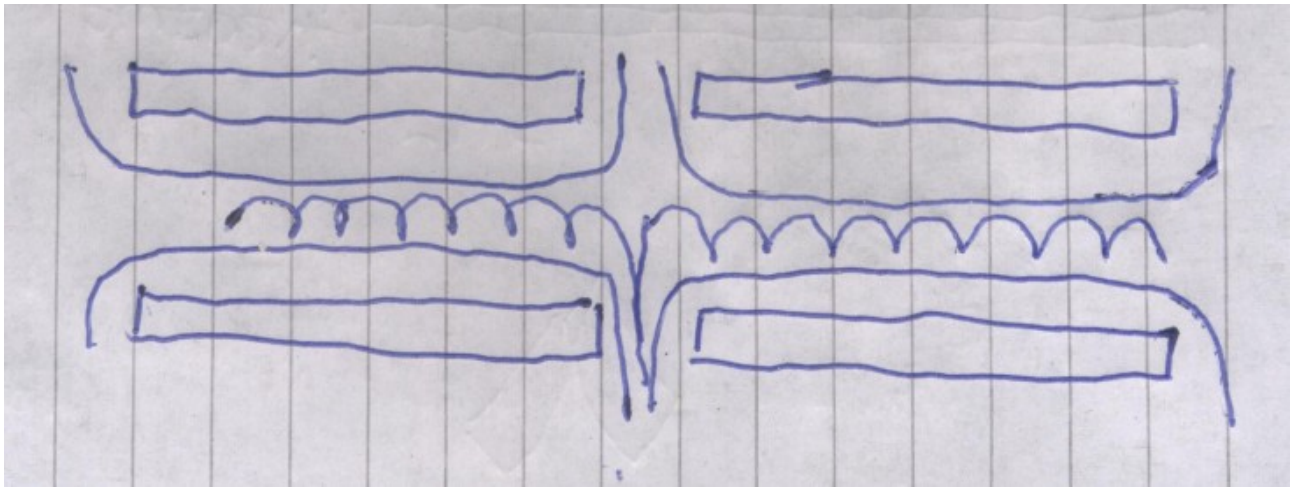
A 3D View



My mathematical skills are not much better. In the LHC the nucleons appear to each other as being long thin rods. In the system proposed they are sheets. It might be nice if they interlock but I suppose that would be too much to hope for. I will again suggest that they spend more time closer together compared to other implementations enhancing that probability.

The bigger point here however, perhaps going more full wrong, is that the apparent charge density is reduced and it becomes easier for that approach to happen overcoming the coulomb barrier.

They Don't Get Better

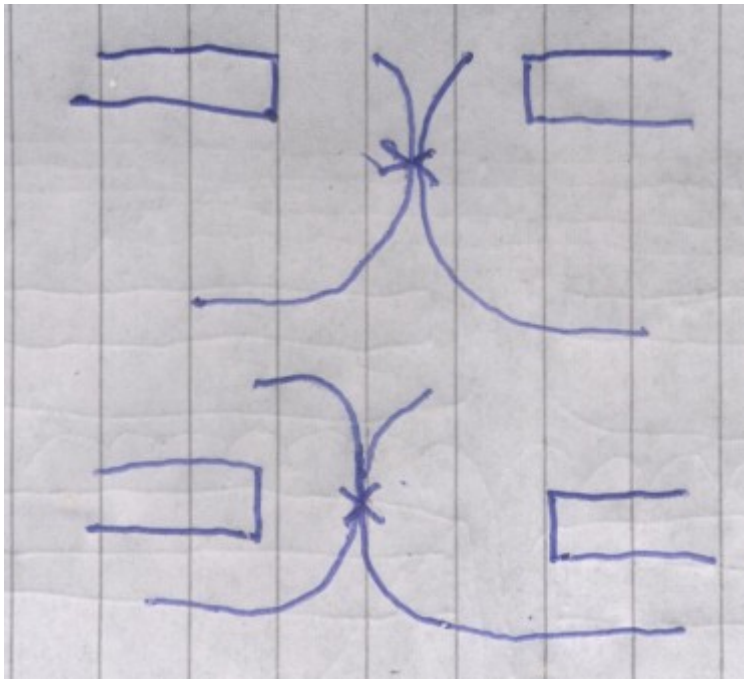


Two opposing solenoids with their fields containing two gyrating nucleons being brought together so they can Kiss. There is a possibility to control this perhaps to a high degree based on nucleon energy and field strength.

We get to adjust the kissing point diameter. At the per nucleon level perhaps not so much but the beams form an annulus such that the bulk as a ring will fan out towards that point. There is a degree of focussing which can be controlled and controlling things is nice. Unfortunately we lose the sheets.

At the intersection the nucleons are gyrating in the same direction and, whilst they move closer together, still good, the lack of relative motion collapses them back into line charges again. My guess was 1KeV per nucleon, 2KeV total. It is the total that matters.

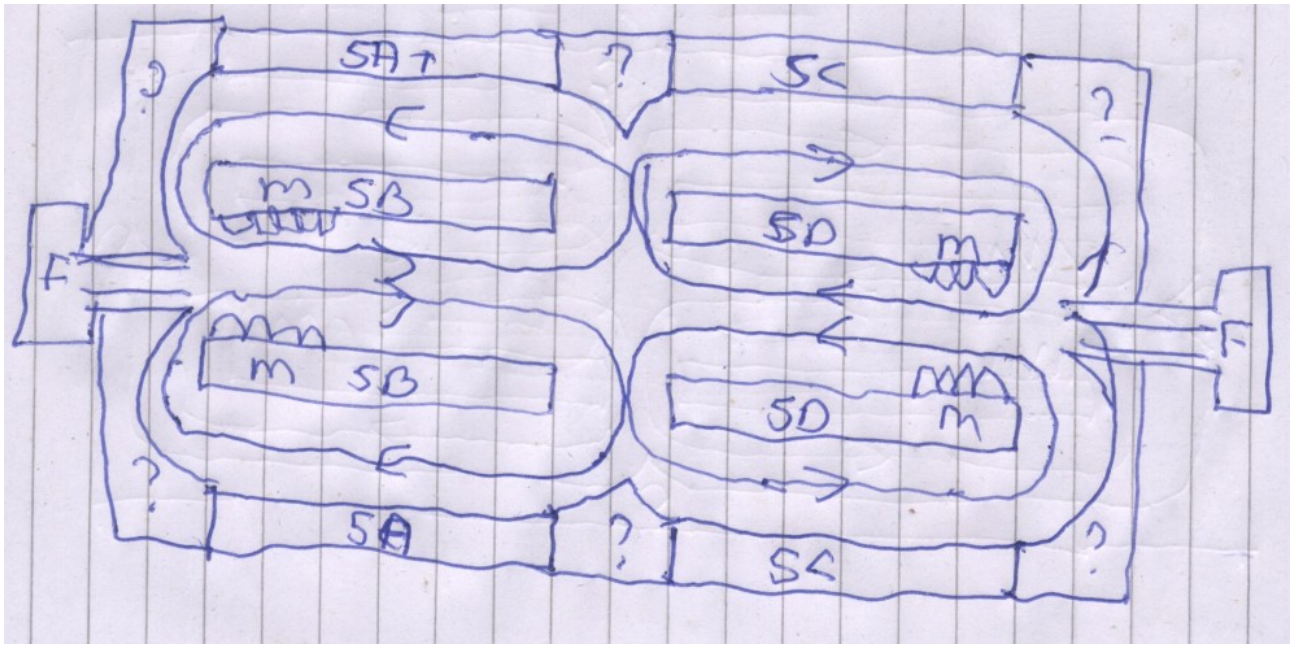
We go 0.5KeV for one nucleon, beam, and 1.5KeV for the other nucleon, beam. The gyration frequencies, velocities, change and we get the sheets back again. The kissing point is offset. We get to control both diameter and offset.



This will or may become important later.

For the moment notice that we are, hopefully, controlling the precise location within the reactor that fusion will, hopefully, occur. JET spends all of its time coming up with instabilities that need to be chased down and the rest of it radiating huge amounts of energy with things doing nothing somewhere else.

I'm Getting the Hang of This

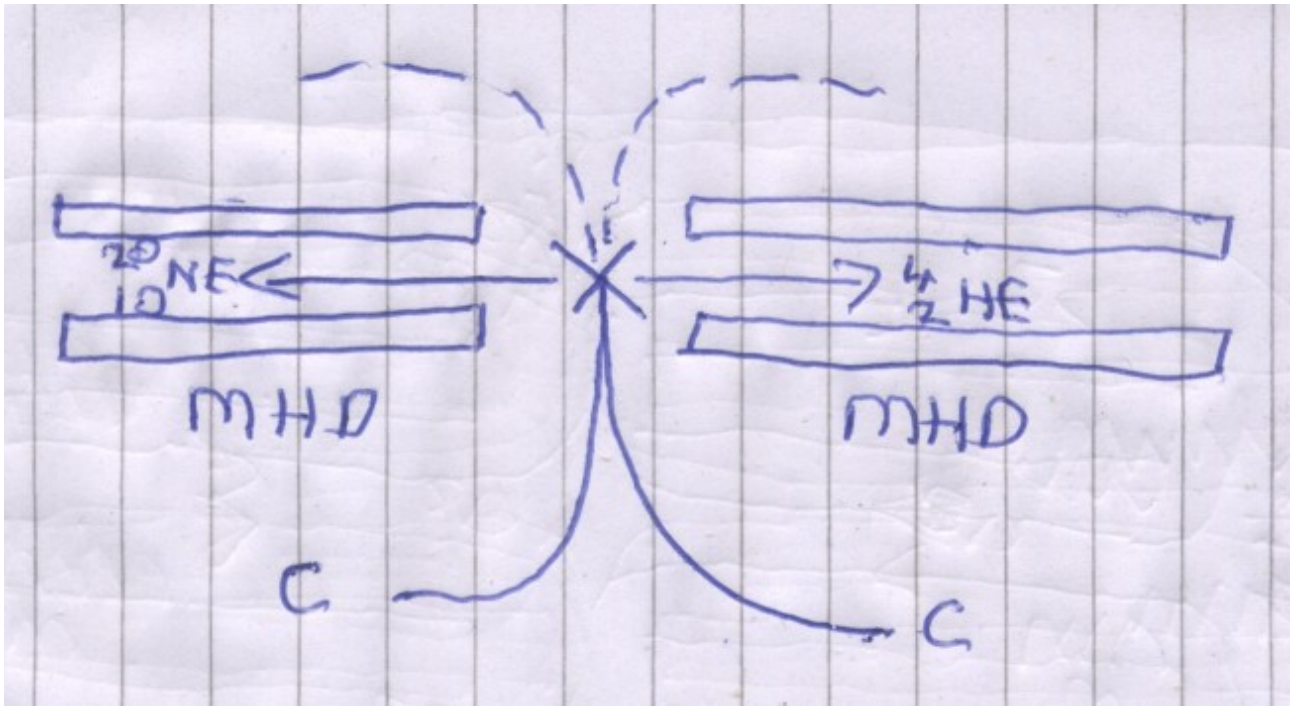


This is my version of Not A Large Hadron Collider. OK. In effect it is two storage rings comprising a pair of concentric solenoids [SA-SD] along with some ? Things to direct the beams around the bendy bits. Maintenance accelerators, M, and fuelling accelerators, F. The arrowed lines are the paths of our nucleons with their Kissing points.

Someone did suggest that this does not work because you need huge injector powers in JET and anyway everything misses everything else in the LHC.

This is comparing apples and pears to my orange. We are achieving the same, perhaps better, energy efficiencies as seen in the LHC. We are also, hopefully, enhancing the probability of fusion and doing so at a specific location...

Now With Added Madness



I like Carbon-Carbon fusion because one of them just produces charged particles with no neutrons or gamma radiation to rot the reactor. I can also claim that this is Carbon-Carbon capture although it might not make a dent on things.

The added mad here is that I am suggesting that emission of products from a fusion event is or can be selectively polarized. I do believe this is a thing and if that is the case we make them squirt down a pair of MHD generators to perform direct electrical energy extraction. Apparently that can be quite efficient but I don't know about them either.

I could theorize about some other things but I'll wrap for now by mentioning Resonance. Apparently this is used in JET and others. The energy of the incoming nucleons must hit the Resonance. In JET it is still a random thing in terms of direction and actual energy. Here it can be precisely controlled.

Keith

Comments Welcome.

fusion@soondae.co.uk