

Non-equilibrium stat mech for Dummies

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From: Jack Sarfatti (*sarfatti_at_pacbell.net*)

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Non-equilibrium physics for Dummies. (Original presentation)

1. Equilibrium Stat Mech

Start with thermal equilibrium Boltzmann factor with a chemical potential u constraint conserving total particle number N .

Equilibrium Probability $\sim e^{-(E - uN)/kT}$

Bose-Einstein condensation (BEC)

$u = 0$ signals at T_c and below onset of phase transition violating N -conservation where N = number of normal fluid particles not in the BEC.

The mean occupation number for IDEAL BOSE GAS is

$$n(E)/N = [e^{(E - uN)/kT} - 1]^{-1}$$

With $u = 0$ below the critical temperature T_c as $T \rightarrow 0$, $n(E) \rightarrow \text{Kronecker delta}^E, 0$, where $E = p^2/2m$ on mass shell for real bosons of rest mass m .

2. Non-equilibrium stat mech.

Every open system has a "cavity quality factor" Q .

$$Q = E/(dE/dt)$$

E = energy stored in the open system

dE/dt is rate of energy leak

$Q < 0$ is an active medium like a laser above threshold.

The NONEQUILIBRIUM Boltzman factor is simply

$$\text{Non-Equilibrium Probability} = e^{-(E + QP - uN)/kT}$$

P = pump power through-put to open system.

Note that as $P \rightarrow$ infinity, the effective temperature

$$T^* = T/(QP/E) \rightarrow 0$$

This explains emergence of order in pumped non-equilibrium systems as $P \rightarrow$ infinity.

On Jul 11, 2004, at 11:41 AM, Jack Sarfatti wrote:

PS

It is important to understand why Hal Puthoff's previous attempts to explain this very same data of Ken Shoulders did not work. Hal did not ask the right question. He is not alone in that of course. Hal made the false assumption that it was the QED Casimir force that would hold the 100 billion electrons together in the charge cluster. In fact what is really going on is a completely different physical effect. It is ZPF induced gravity dependent on partial vacuum coherence. BTW when one reads "Science and Ultimate Reality" it is obvious how the string-brane theorists are shining strong lights in the wrong part of the Dark Cave. You do not now seem to need exorbitant new mathematical superstructures like "colliding branes" to explain any of the new cosmological observations nor any of the high energy physics particle observations.

One loose end in the charge clusters model is to explain how total charge is globally conserved over all. What happens to the positive charge image cluster (much heavier) twin to the electron cluster?

On Jul 11, 2004, at 11:16 AM, Jack Sarfatti wrote:

PS: Ken's lab experiments seem to be relevant to this discussion. His "charge clusters" (AKA "EVO") that I interpret as glued together by strong short-range effective gravity induced by micro-quantum zero point energy exotic vacuum cores on the mesoscopic scale are self-propelled charged geons. The self-propulsion comes for temporary unstable inhomogeneous distributions of positive and negative zero point quantum pressures at different parts of the EVO.

On Jul 11, 2004, at 6:59 AM, Ken Shoulders wrote:

SUPERLUMINAL PARTICLE MEASUREMENTS

by

Ken Shoulders and Dr. Jack Sarfatti

Abstract

Measurements made on clusters of electrons operating as Exotic Vacuum Objects, or EVOs, show velocities exceeding that of light. A theory of this behavior is presented based on manipulation of parameters available in this new field of exotic vacuum engineering.

This paper can be downloaded from: <http://www.svn.net/krscfs/>

Ken Shoulders

Note that Ken was a long-time collaborator of Hal Puthoff's way back in Hal's National Security Agency days. Ken has many patents in micro-wave miniaturization and has devoted many decades to these EVO measurements.

On Jul 11, 2004, at 10:58 AM, Jack Sarfatti wrote:

On testing macro-quantum theory of emergent gravity in cosmology
On Jul 10, 2004, at 12:10 PM,

This is the one to shoot down.

<http://qedcorp.com/destiny/CoherentCosmos.pdf>

(expanded version posted last night)

If you can?

Show it is wrong, or not even wrong.

Happy Hunting.

:~)

Paul

On issue of the tidal stretch-squeeze liquid drop local measurement of the curvature tensor in free float LIF that is not a problem. As Ray Chiao points out in his "Conceptual Tensions" paper in "Science and Ultimate Reality" you need to distinguish the center of mass motion from the relative motion of a spatially extended object like even a small liquid drop with small enough surface tension. The g-force argument of local vanishing of the connection field applies only to the center of mass effective "point test particle" degree of freedom, not to the tidal stretch-squeeze relative motions of the pieces of the liquid drop, which must be "free" (ignorable interparticle forces) to get a good measurement.

Now, in terms of "nonlocality" of the pure gravity energy.

Obviously we can trivially define a local stress-energy density tensor for the pure vacuum gravity field as simply

$$t_{\nu\mu}(\text{Geometry}) = (c^4/G)G_{\nu\mu}$$

$$G_{\nu\mu} = R_{\nu\mu} - (1/2)Rg_{\nu\mu}$$

Einstein's 1916 field equation is then simply

$$t_{uv}(\text{Geometry}) + T_{uv}(\text{Matter}) = 0$$

In the classical vacuum with zero micro-quantum ZPF i.e. $\Lambda_{\text{zpf}} = 0$

and with $T_{uv}(\text{Matter}) = 0$

Then trivially

$$t_{uv}(\text{Geometry}) = 0 \text{ in non-exotic vacuum.}$$

MTW say this.

The problem is that you cannot get a global P_u from integrating this $t_{uv}(\text{Geometry})$ over 3D space for a "Geon" in Wheeler's sense.

You need to split the tensor $t_{uv}(\text{Geometry})$ into two pseudo-tensor pieces, one is a kind of background frame for the other, which when integrated gives a P_u for gravity waves from the rotating vibrating Geon.

Note, in terms of metric engineering.

When $\Lambda_{\text{zpf}} = 0$, at the given scale, with zero torsion and zero other fields from NOT locally gauging complete conformal group,

$$T_{uv}(\text{Matter})^{;v} = 0$$

$$t_{uv}(\text{Geometry})^{;v} = 0$$

Separately. No intermixing between the geometrodynamics and the matter fields that live on the geometrodynamics.

This FORBIDS metric engineering. But the situation changes when $\Lambda_{\text{zpf}} \neq 0$!

I leave for airport to London in a few hours.

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