Explaining yang mills theory and mass gap and proton mass based on mathematical heuristics.
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Abstract.

Hydrodynamic of vortex flows can explain quark gluon plasma fluid flows as an highly idealized liquid which has transition to a hadronic phase to account for nuclear matter components like protons.The mass of quarks are only in a tiny part derived from the Higgs field mechanisms. Strong forces in the atomic nucleus hold together quarks and gluons in the protons as components of nuclear matter. QCD theories are sought to account for the strong fields and hadron mass.
There are possible correspondence and analogies with quantum hydrodynamic and its conformal thermodynamics,which might explain the mass gap based on turbulence of vortex flows and its shock wave like energy dissipation leading to a thermodynamics and its momentum or mass derivations.
The yang mills theory emerges as an interphase of quantum electrodynamics,vortex hydrodynamics and conformal thermodynamics,so that the nuclear matter and hadronic phase has entropy and information transfers to experience a Higgs like mechanism and phonon modes for self interactions leading to mass and momentum effects.

The mathematical models of Hamilton Jacobi equations for positive and negative mass ensembles approximate to a Stochastic NLSE as a Schrodinger expression derivation of Lindblad master equation for heavy quark QCD or QED models. The negative mass like effects can occur in spin orbit coupled high angular momentum idealized fluids at relativistic limits and quantum limits ,explained by GP equations as NLSE approximations for hydrodynamic plasma vortex flows. The hydrodynamics has analogies with QED,and conform to thermodynamics in the entropic limits,and its dissipative turbulence and fluctuations in energy.
The Higgs like phonon modes are the result of angular momentum and mass or energy distribution and equilibrium processes described by LG Boltzman equations corresponding to Schrodinger equations in the non linear limits.
The self interaction potential can explain mass gap and gluon condensates,and yang mills theory based topological phases with quark hadron transitions and symmetry breaking,that is a combination of the QED,hydrodynamic and thermodynamic energy and mass- momentum transfers,and confining hadronic pressures due to negative mass effects.This paper presents a heuristic model to examine this.

Introduction.

The protons are main components of nuclear matter,as hadrons at atomic nucleus,accounting for most of its mass.
Protons are having a quark gluon plasmic fluid kstructure at ultra high temperatures. The quarks are bound together by gluons which are particles of the strong force fields,eventually contributing to confinement,hadronically.

There is a transition from the quark gluon plasma fluid to hadronic phase in the proton cores. The transition zone is characterized by instabilities and fluctuations in the fluid flows of the quark gluon plasma as an idealized liquid. The hydrodynamics of vortex flows apply in explaining the turbulence and instabilities. There is a quantum substrate in the flow medium,which could correspond to and have analogies with superfluid flows,with ultra high vorticity.
The quark gluon fluid is the most vortical liquid,surpassing the quantum fluid fermionic condensates,conforming to classical hydrodynamic vortex flows and Onsager turbulence model. The energy condensation of turbulence is dissipated thermodynamically.
There is alignment of spin and angular momentum in the flow medium,based on vorticity,which could conform to magnetization. There is combination of hydrodynamics and magnetodynamics for spin polarization,resulting in interactions of vortex pairs,and its thermodynamics.

Heuristic model for proton mass.

Heuristics based on quantum hydrodynamics and associated thermodynamics that conform to it,can explain mass anomalies in quarks,given that Higgs field interactions account for only a tiny part of the mass of protons,based on quark mass,as derived from the Higgs mechanism. The rest of mass is accounted through the QCD model and the strong force field effects,and associated aspects of quark and gluon condensates or heavier quark mechanisms,and related momentum transfer mechanisms,within the QCD lattice like structures.
There are outward pressures due to contributions from interactions involving both quarks and gluons,which is found to peak at .8 fm,in proton cores,which also see corresponding confining pressures at 10^35 Pascal.(1)
The spin orbit coupling possibilities of high angular momentum vortical fluids can simulate negative mass like effects,so that outward pressures lead to a pulling together of quarks in the medium,causing hadronic confinement close to quark hadron transitions.(2)
The quark gluon fluid transition to hadronic phase also implies that thermal energy flows for dissipation kinetics of turbulence,conform to thermodynamics corresponding to the hydrodynamics.(3),(4).
The thermal energy quasi particle dissipation is of the order of .5 GeV,which approximately correspond to proton masses. The negative energy like mass effects lead to confinement of quasi particles coupled to the quarks,as a result of gluon condensate effects in QCD lattices. This is similar to phonon modes deriving from thermodynamics due to vortex hydrodynamics flows,and its dissipation of energies on account of instabilities and turbulent fluctuations,close to hadronic phase transitions.
The quark gluon plasma has energy densities of the order of nearly 1GeV per fm^3,which thermodynamically translates as .5GeV if dissipation energies of thermal quasi particles,deriving from turbulent vortex flows and its energy condensation close to quark to hadron phase transitions.(5),(6).
The QGP thermalizes fast to form vortices in the fluid flows,and the fluid medium responds to such vortex hydrodynamics in ultra high vortical and idealized liquids like quark gluon plasma fluid.

Whirlpools within QGP have their spins on an average aligned with angular momentum.(7),(8). There is possibly spin orbit coupling analogous to superfluid as bosonic quantum condensate systems or superconductors as topological materials,with the difference that QGP is up to 18 orders of magnitude higher in temperatures,as compared to quantum super fluids,as bosonic condensates.(9),(10).
There is vorticity induced spin alignment with angular momentum,causing vortex interactions and energy condensation for turbulence with a quantum substrate. Large angular momentum manifests as flow vorticity with rotational structure corresponding to magnetization and leading to polarization,which has coupled kinetics translated to electrodynamic effects.
This would have an effect on plasma thermodynamics,given the high baryonic chemical potential of strongly coupled plasma flows in a medium characterized by ultra high vorticity and angular momentum..
Expanding plasmas in fast thermalization with large baryonic chemical potential and magnetic and vortical flows could have anisotropic geometries in fluid medium topologies, corresponding to turbulence like flow properties.Excitations of coherent field modes have power spectrum similar to turbulent vortex flows,with quantum substrates. This leads to dissipative hydrodrodynamics,and energy transfers.
The shear viscosity is minimal at phase transition threshold where the fluctuations are maximal and thermal paarticles or quasi particles have energies of the order of .5GeV,matching with proton masses. There is an energy to mass transformation in the hadronic core of protons with its QCD lattice like structures,and phonon modes.
This is the opposite of mass to energy transformation in nuclear fission or fusion.
Flow properties are derived from small viscosities and large fluctuations,so that geometrical anomalies in topological structure contributes to dissipative hydrodynamics conforming to its thermodynamics and phonon modes.

Conclusion.

The hadronic phase implies a transition to the QCD like lattice vibration for the thermal flows,similar to shock waves from turbulent flows in quantum fluids that are associated with energy dissipation.(11)
There is a phonon mode correspondence of thermal particles with its confining pressures due to negative mass like effects based on spin orbit coupled vortex flows with anisotropies of angular momentum distribution in the medium.
This will translate as topological geometries that lead to instabilities and fluctuations associated with turbulent flows,where a quantum substrate is involved having correspondence with classical turbulence,and its energy dissipation due to viscous flows in the medium.
This could be considered as a correspondence with quantum vortexfluid flows where spin orbit coupled substrates can lead to anomalies like negative mass like effects.
The thermodynamics associated with hydrodynamics of turbulent vortex flows lead to energy dissipation as quasi particles which translate as confining pressures and local phonon modes in lattice structures of the QCD hadronic phase.

This results in quark and gluon pairing mechanisms and bosonic condensates to account for heavy quark and gluon condensate mechanisms and its quark confinement,as a lattice vibration phonon mode mechanism with higher amplitudes corresponding to a Higgs like higher frequencies involved in explaining high temperature superconductors.

In a gauge gravity duality perspective,quark confinement deconfinement have been sought to be explained with conformance to superconductor Mott insulator transitions.(11)

The BCS transition to BEC regime has been cited with reference to energy condensation in vortex flows where small forcing can lead to large flows.

Negative temperature state could prevail in the initial conditions in the ergodic boundary prior to onset of quantum turbulence.

This can explain thermalization of a fast nature,as one can associate with quark gluon plasmic fluids at the big bang beginnings of mass creation and nuclear matter formation. The negative temperature state prior to onset of quantum turbulence in the QGP substrate can drive the hydrodynamics and associated thermodynamics,for dissipation of thermal energies at the quark hadron transition regime. The negative mass like effect due to spin orbit coupling based on angular momentum influences in the medium can contribute to confining pressures where the outward pressures in proton hadronic cores peak.The negative mass effect will account for a large part of the confining pressures.

Hydrodynamic expansion converts geometric anisotropy in the topological structure of the medium to mass or momentum anisotropic effects which thermodynamically evidences as equilibrium processes based on phonon modes in lattice like hadronic structures,and its mass gap.

The energy transport is dominated by thermal quasi particles,maximally at the quark hadron transition phase threshold,where it roughly peaks to match approximately the mass of the protons,explaining the mass effect due to higher amplitudes of phonon modes in QCD lattice like structures in hadronic cores of protons,which are thermodynamically driven. The medium has ability to transfer momentum via strong interactions in QCD structure and maintain local equilibrium through enhanced mass effects,thus accounting for most of the mass of the protons.Otherwise,Higgs mechanism would account for only a small part of the proton mass due to quarks.

QCD interactions imply a spin orbit coupling,so that orbital angular momentum causes a global spin polarization of quarks and antiquarks.You have seen how hydrodynamics converts geometric anisotropy deformations to flow momentum. There is a transition from hydrodynamics to thermodynamics and phonon modes at higher amplitudes in a Higgs like mechanism with its weakly commissions kinetics involving quarks and gluons,explaining energy condensates and mass enhancements in hadronic confinement. This can have analogies to topological phase transitions corresponding to anomalous superconducting regimes in a gauge gravity duality correspondence,given the quantum nature of the substratum for fluctuations and turbulence in the transition regime,conforming to a BCS to BEC one for quantum super fluids.

The QGP plasma harmonized as the system underwent a phase transition. The low viscosity appearing at the critical point of transition now translates to more viscous hadronic states. The fluctuations that dominate due to low viscosities are dampened with accompanying energy to mass transformation,in the hadronic phase.

QGP as a strongly coupled plasma behaving like an idealized fluid at ultra high temperatures conforming to models of quantum fluids,has ultralow viscosities at quark to hadron transition,where the flow properties are due to ultra low viscosities and large energies of fluctuations,which have a quantum turbulence substratum,corresponding to classical onsager model.
The dynamics of the quark gluon plasma can be modelled within the framework of relativistic dissipation hydrodynamics with correspondence to quantum turbulence in the medium sustratum. The hydrodynamics of vortex flows converts geometric anisotropies to momentum anisotropies,leading to the flow structure and ensuing thermodynamics.
The effects of anisotropy are encoded in the angular momentum transferred to the medium,which create turbulent bosonic condensate fields of gluons.
There is thermal particle production in the presence of energy condensation and its dissipation driven by momentum anisotropies coupled to topological geometric structure,at the transition phase.
The momentum anisotropy present during hydrodynamic evolution of QGP medium can be captured as modification of local equilibrium distribution of gluonic and quark and anti quark degrees of freedom. There is momentum broadening and energy dissipation which translates as enhanced mass effects in hadronic phase of proton quark confinement.

There is a combination of electrodynamics,hydrodynamic nature and relativistic thermodynamics in explaining the nuclear mass and strong forces.
The heavy quark model and its quantum dynamics conform to a Stochastic non linear Schrodinger equation,as a derivation from the statistical ensemble of positive and negative mass like dynamics described by a classical Hamilton Jacobi equation which in the quantum limit corresponds to a Lindblad master equation for a heavy quark model,that approximately conforms to stochastic NLSE.
The NLSE can describe plasma behaviour of quantum super fluids and relativistic perfect fluids like Dirac Fermi systems of low and high temperatures idealized liquids.
The Madelung transformation can represent complex scalar field approaches of NLSE descriptions of quantum electrodynamics of plasma systems as hydrodynamics of vortex flows,confirming to its relativistic dissipative thermodynamics.
The Klein Gordon equations are relativistic extensions of Schrodinger equations for gravity models or combinations with quantum theories as for blackhole physics.
The spin orbit coupled systems of hydrodynamical vortex flows can be best described by Gross Pitaevski equations,GPE,and its variants,approximated from NLSE,with a salary integral for turbulent flows and energy dissipation,explaining the thermodynamics.
They apply to superconductor models of symmetry breaking and Higgs like mechanisms and its phonon modes in lattice like structures of quark confinement and hadron deconfinement models of nuclear mass corresponding to superconductor models as topological systems.
The yang mills theory and symmetry breaking models have correspondence to topological superconductor systems with a BCS to BEC like transition regime,characterised by quantum turbulence,and negative temperature state in the initial conditions prior to turbulence,and thermodynamic energy dissipation,as phonon modes.There is a combination of

electrodynamics,hydrodynamics and thermodynamics and the two types of spontaneous symmetry breaking modes,involving also the Higgs like mechanism,in explaining the mass gap.
There is a case for transfer of angular momentum distribution and its thermodynamics of equilibrium processes described by lattice gas Boltzmann equations,which could derive NLSE.
KThere is a negative mass like effect explained by the GPE in the gluonic condensates which account for the heavy quarks,and strong forces in part,as well as mass gap in yang mills theory,with its topological phase transitions and symmetry breaking.
The bosonic field can be explained by complex scalar field theory with self interaction potential to account for gluonic condensates with a positive mass anomaly due to Higgs like mechanism in hadronic lattice like structures,deriving from the thermodynamics of dissipative hydrodynamics of vortex flows and turbulent fluctuations associated with quark gluons plasma fluids.
The hadronic Higgs like mechanism in QCD lattice like structures also explains the heavy quarks,and the mass of the Higgs field itself.There is also a neutralization of momentum and outward pressures due to negative mass like effects.
This could also be a laboratory model for Einstein Cartan theory for negative mass like effects based on minimal coupling of Dirac spinor fields and torsion fields with geometric curvatures in Blackhole interiors,representing ER bridges as entanglement entropy.
The quantum chromo fields might be derived from such QED,Hydrodynamics and relativistic thermodynamics interactions and interphases,which are explained by the yang mills theories and mass gap,as described based on the mathematical heuristics as above.

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