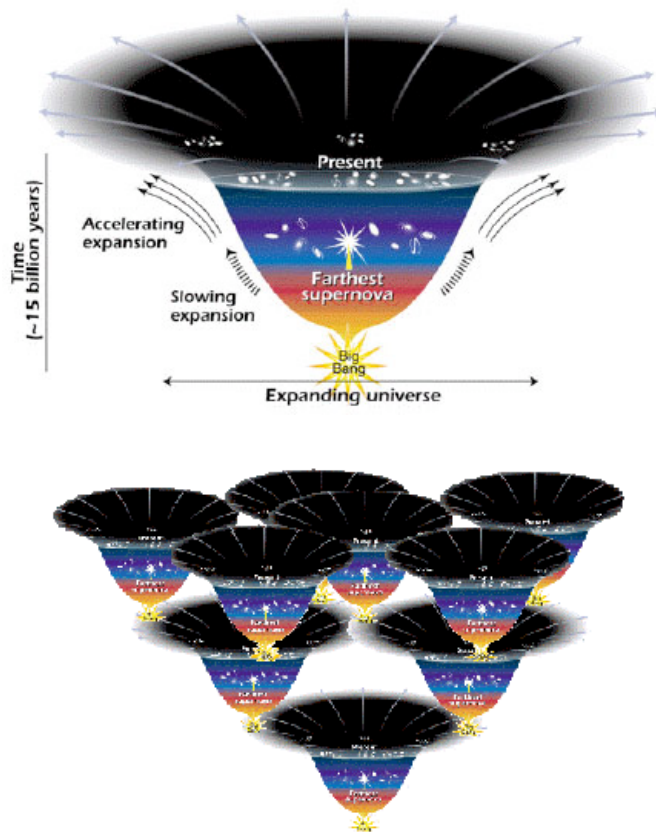


# Einstein's gravity as an emergent macro-quantum coherent vacuum field

Jack Sarfatti



- The world hologram model gives the observed dark energy density  $\sim hc/NL_P^4$  when the hologram is the retro-causal future de Sitter thermal horizon with Hawking temperature  $T \sim hc/N^{1/2}L_P k_B$ .
- Dark energy as uncohered  $w = -1$  vacuum zero point energy with negative pressure causing universal repulsion in Einstein's 1915 GR.
- Dark matter as uncohered  $w = -1$  vacuum zero point energy with positive pressure causing universal attraction that *mimics*  $w = 0$  CDM asymptotically in gravity lensing.
- Therefore, LHC cannot see on-shell real dark matter quanta.
- *The future and the future alone is the home of explanation.* Henry Dwight Sedgwick, 1908

## Emergent Curvature Disclination Tetrads & Torsion Dislocation Spin Connections

- Superfluid 3-velocity Cartan 1-form  $v \sim (h/m)d\theta$
- Curvature T4 local gauge 4-potential  $A^I_{T4} = \text{diag}M^{IJ} = M^{II}$
- Torsion SO1,3 spin connection  $\omega^{IJ}_{SO1,3} = M^{[I,J]} = c^{IJ}_K e^K ?$
- M-Matrix  $M^{IJ} = d\theta^I \wedge \phi^J - \theta^I \wedge d\phi^J$
- Four tetrad 1-forms  $e^I = (\text{Minkowski})^I + A^I$
- $ds^2 = g_{\mu\nu}(\text{LNIF})dx^\mu dx^\nu = \eta_{IJ}(\text{LIF})e^I e^J$  EEP
- Six spin connection 1-forms  $\omega^{IJ} = \omega^{IJ}_{T4} + \omega^{IJ}_{SO1,3}$
- Four torsion 2-forms  $T^I = de^I + \omega^I_K \wedge e^K = \omega^{IJ}_{SO1,3} \wedge e^J = c^{IJ}_K e^K \wedge e^J ?$
- Six curvature 2-forms  $R^{IJ} = d\omega^{IJ} + \omega^I_K \wedge \omega^{KJ}$

# Inflation as partial cohering of false vacuum - the 4% solution - a point on the cosmic landscape

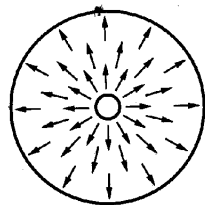
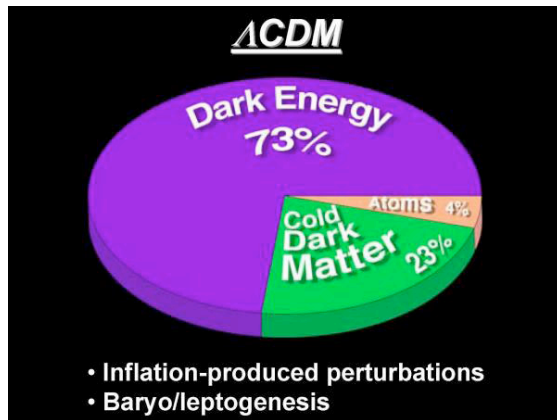
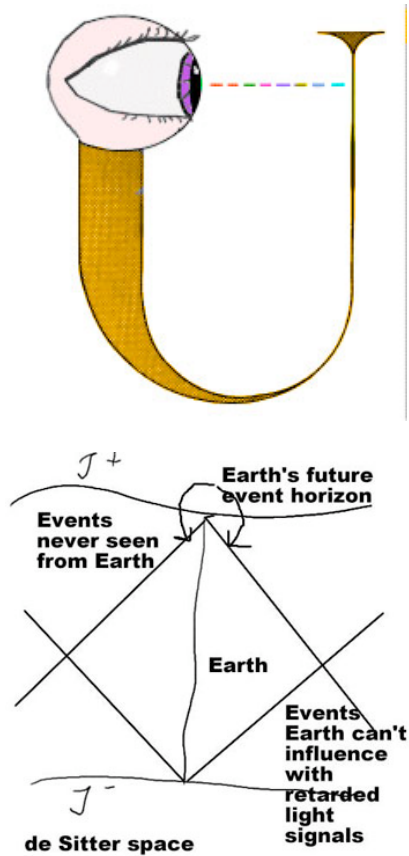


Fig. 1. Magnetization pointing outwards in the space between two spherical enclosing surfaces. This is known as a hedgehog. David Thouless Topological QM book

- Goldstone hologram phases  
 $\theta(\phi)^2 = \theta(\phi)^I \theta(\phi)_I$
- Vacuum ODLRO Higgs fields  
 $\Psi_1, \Psi_2, \Psi_3$
- $S^2$  vacuum manifold
- GMD stable hedgehog  
monopole defect nodes of  
Higgs fields separated by  $\Delta L$   
(world crystal lattice)
- Bekenstein BIT  $N =$  wrapping  
integer of  $2^{\text{nd}}$  nontrivial  
homotopy group

# Future de Sitter Infinite Red-Shift Thermal Horizon as Retro-causal Wheeler-Feynman Total Absorber World Hologram?

*One also suspects that the new paradigm will incorporate the idea of retro-causality. Bernard Carr*



- $T_{\text{Hawking}} \sim hc/Lk_B$
- $L \sim N^{1/2} L_P$
- IR/UV String-Horizon Duality
- IR  $\rho_{\text{DE}} \sim k_B T/L_P^2 L$  ( $S^1$  tube)
- UV  $\rho_{\text{DE}} \sim hc/L_P L^2 L_P$  ( $S^2$  shell)
- $\nabla \rho_{\text{DE}} \sim hc/NL_P^4 \sim (10^{-3} \text{ ev})^4 \sim (3 \times 10^{-2} \text{ cm})^{-4} \sim (\text{geometric mean of longest \& shortest lengths})^{-4}$
- $= (\text{IR} \times \text{UV})^{-4}$
- $N = 2\text{D pixels} = 3\text{D voxels} \sim 10^{120} - 10^{122}$
- $\nabla \Delta L \sim (L_P^2 L)^{1/3} = N^{1/6} L_P$
- $\sim 10^{-13} \text{ cm} \rightarrow (1\text{Gev})^{-2}$  scale universal hadronic Regge slope