

Information is Protophysical

by

Douglas J. Matzke

Senior Member of Technical Staff

Texas Instruments

matzke@daldd.sc.ti.com

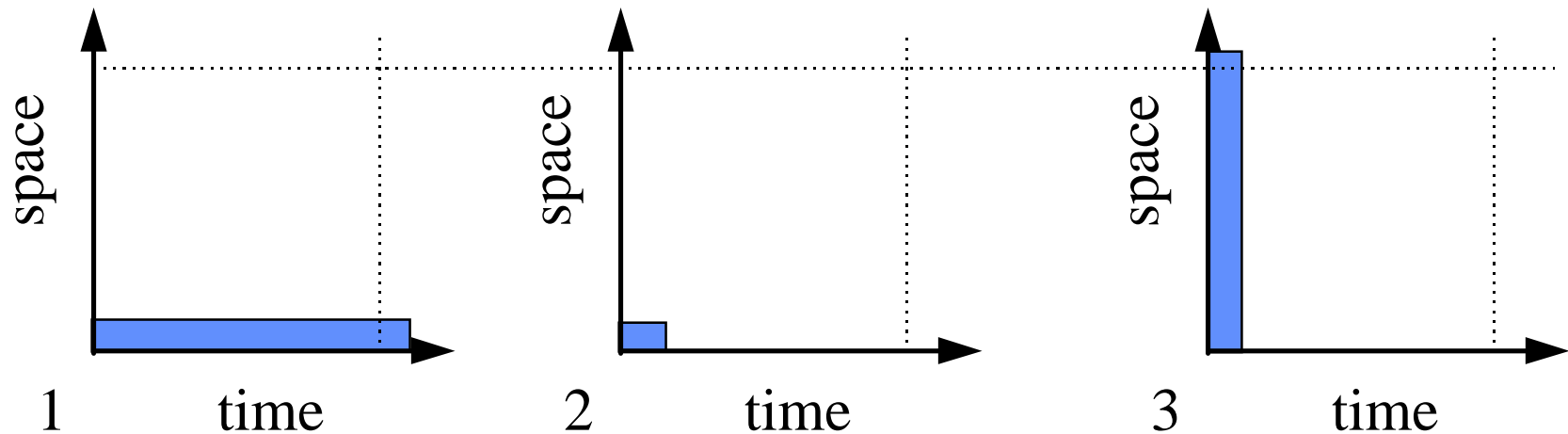
Information Constraints precede spacetime - protophysical

- Information is physical
 - inside normal spacetime
- Relativity spacetime via observer frames
 - arbitrary elastic spacetime
- Quantum computing
 - Outside localized spacetime
- Goal to unify observer (or spacetime) for:
 - Information and computation
 - General relativity
 - Quantum consistency

Thought Experiment 1

NP complete algorithms and implementations:

- 1 Spatially bound - time longer than universe
- 2 Quantum polynomial time - quantum computer solvable
- 3 Temporally bound - exceed black hole mass limit



Thought Experiment 2

Twin Paradox - time dilation due to acceleration

- Human stays younger = **GOOD**
- Computation proceeds slower = **BAD**

Question:

Can any motion accelerate computation?

Answer:

Accelerate universe away from computer!

(relativistic thinking similar to Mach's mass shell)

High Dimensional Properties

- Massless properties are expected
- Primitive time is acausal (non-local)
- Key Computation topology issue:
 - Definition of space (via architecture) defines time properties
 - Objects using virtual memory pointers as spatial microcode
 - Coding Theory, NN, & CAM use high dim. for code separation
- Simulated vs real spaces
 - Isotropy in real spaces - simulated spaces are folded
 - Temporality is integral part of space
 - Information metrics vs energy metrics

Thought Provoking Questions

- 1) **Supposition:** A bit is equivalent to energy/mass:
Question: How many bits in primitive particles?
Discussion: Also quantum probability distribution and info. content of free space (zero-point energy=info)
- 2) **Supposition:** Simulating inertial frame requires bits:
Question: Do inertial frames have physical mass?
Discussion: Inertial frames can not be applied to photons and can not be acted upon.
- 3) **Supposition:** Quantum, relativity & info/computation have observers:
Question: Can we unify notion of observer in these areas?
Discussion: Energy/Information duality paradox is similar to particle/wave duality early in century
- 4) **Supposition:** Traditionally, information encoded as matter/energy:
Question: Can we have information encoded without matter/energy?
Discussion: Wheeler's pregeometric spacetime topology, quantum

Conclusions

- Thought experiments are useful - many questions
- Unification of compu-quantum-gravity requires same notion of observer (spacetime)
- Topology and spacetime properties is key
- Paradox of information vs energy duality
- Information within 4space is physical (energy)
- Information outside 4space is protophysical