How to Build a Time Machine?

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Introduction

- Criticise standard model of time symmetry.
- Propose a new model of time.
- List physical phenomena that are qualitatively explicable in the new model of time.
- Criticise both of my earlier proposals to detect reversals in the direction of time-flow.
- Propose a more robust experiment to detect reversals in the direction of time-flow.
- Invite comment on: originality, explanatory power, and feasibility of the new experiment.

Standard Time Symmetry

If time reversed all particles would re-trace their paths exactly.

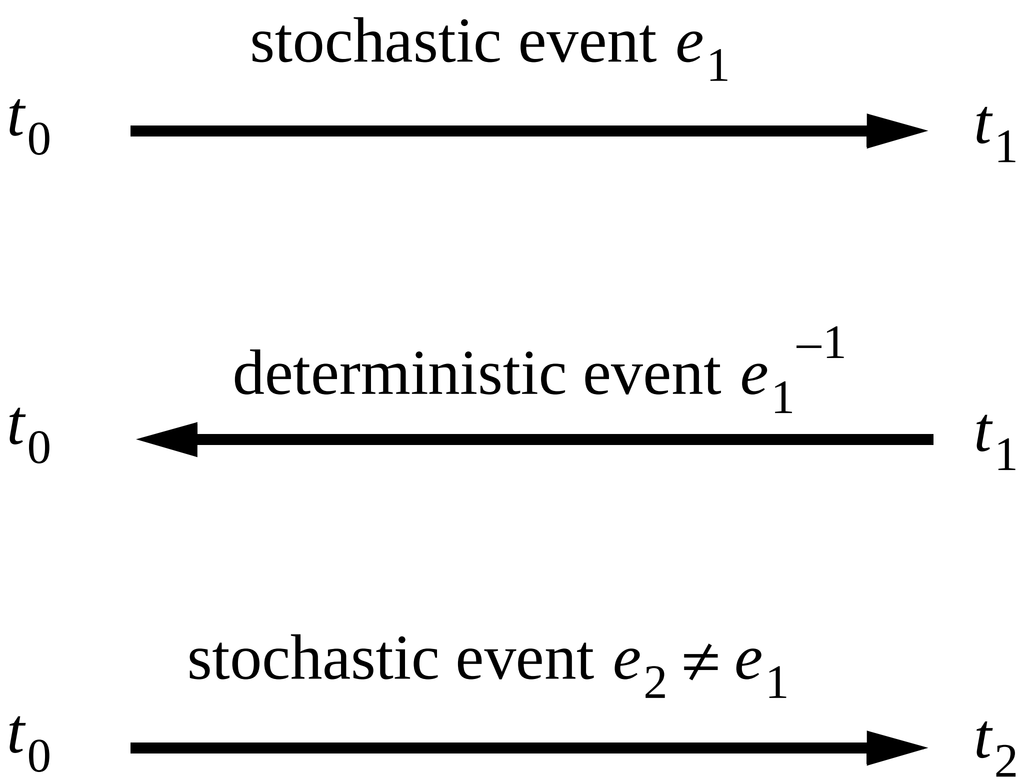
- Forward time-flow is stochastic at the quantum level.
- Backward time-flow is deterministic at every level.

That is, the physics of the universe changes with respect to the direction of time-flow so as to admit the standard model of time symmetry.

Given that we have not detected reversals in the direction of time-flow this fails Ockham's razor.

Standard Time Symmetry

If time reversed all particles would re-trace their paths exactly.



Standard Time Symmetry

If time reversed all particles would re-trace their paths exactly.

- Can a particle travelling forwards in time interact with a particle travelling backwards in time?
- If so, which parts of the interaction are stochastic, and which parts deterministic?
- If there is a time reversal, can the stochastic and deterministic parts of the interaction swap over, so as to maintain standard time symmetry?

A theory that fails to make predictions is weak.

Standard Time Symmetry

If time reversed all particles would re-trace their paths exactly.

- All physical equations are deterministic.
- They describe deterministic, backward time-flow perfectly,
- But do not describe specific, stochastic, i.e. quantum, events in forward time-flow.

That is, all physical equations beg the question of time symmetry and fail to explain the forward, stochastic, evolution of time (time’s arrow).

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Standard Time Symmetry

If time reversed all particles would re-trace their paths exactly.

- Standard time symmetry might be correct.
- But it fails Ockham's razor.
- It fails to explain forward time-flow (time's arrow).
- And it fails to predict what would happen in time-flow oscillations.

That is, the standard theory lacks explanatory power, even if it is correct.

New Model of Time

- I hypothesise that the direction of time-flow oscillates and define that this is called, “oscillating time”.
- I will propose an experiment to test this hypothesis.
- As a matter of definition in English, “random” events are not affected by outcomes at an earlier or later time, so they are, by definition, generally irreversible in time.
- I define that a generally irreversible increase in time caused by random events is called, “elapsed time”.

That is, the new model of time is composed of oscillating and elapsed time.

Explicable Phenomena?

- Time’s Arrow

  Random events are generally irreversible. Therefore, they enforce time’s arrow.

Explicable Phenomena?

- Monotonically increasing entropy.

  Regardless of the direction of time-flow, stochastic events occur, increasing the disorder of the universe.

  That is, increasing entropy can run counter to the direction of time-flow.

  Entropy and the direction of time-flow are different, but related, phenomena.

Explicable Phenomena?

- Superposition

A particle whose motion has an added component of time-flow oscillation can occupy many positions at one time.

All measurements involve stochastic, quantum, events and therefore cause a forward motion of elapsed time.

In standard terms this forward motion is called a "collapsing" of the "wave function".

Explicable Phenomena?

- Sum Over Histories

  A particle whose motion has an added component of time-flow oscillation spends more oscillating-time on or close to the shortest path, prior to a random event.

  So when a random event causes a forward motion of elapsed time, the particle is found on or close to the shortest path, depending on the statistics of time-flow oscillations.

  There is no wave function, or collapse of a wave function, just a superposition of a particle in oscillating time which is forced into one state by a random event.

Explicable Phenomena?

- Uncertainty Principle

  A particle subject to an added component of time-flow oscillation has some random component to its position and energy depending on when in oscillating time a random event causes oscillating time to elapse.

Explicable Phenomena?

- Electron Tunnelling

  An electron subject to an added component of time-flow oscillation has some random component to its position and energy depending on when in oscillating time a random event causes oscillating time to elapse.

  High energy states allow an electron to tunnel through an energy barrier.

  The energy distribution of an electron depends on the statistics of time oscillations.

Explicable Phenomena?

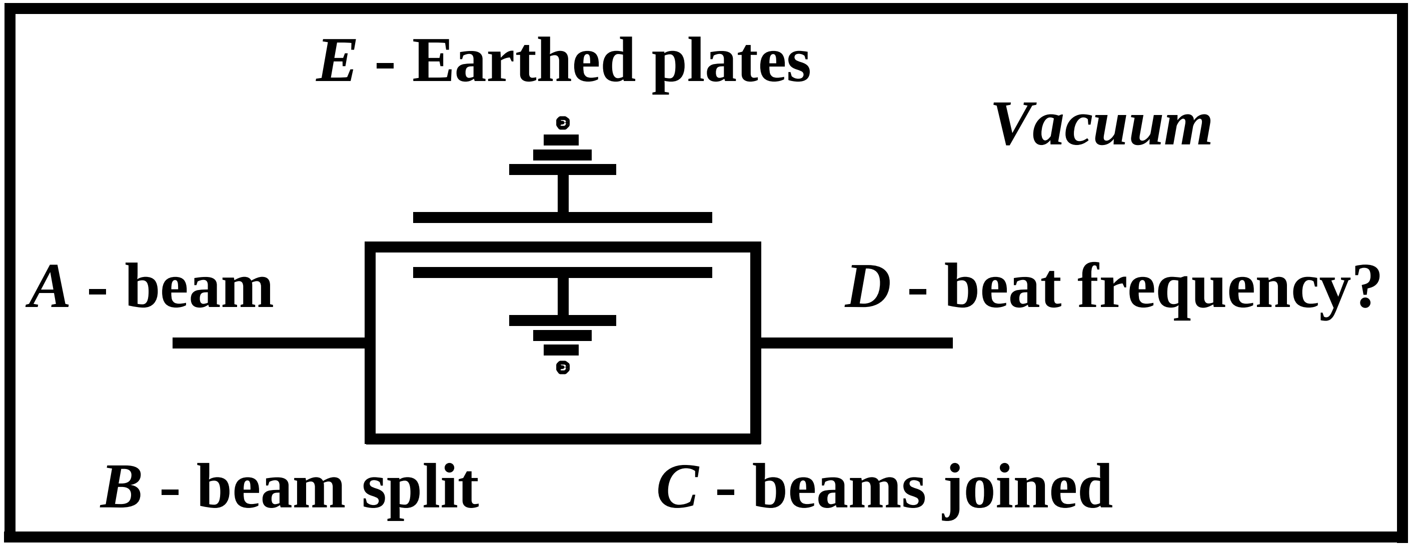
- General Time-Travel Exclusion Principle

  In general, the statistics of random events make it vanishingly unlikely that the universe can revert to its state at an earlier elapsed time. So time-travel, by winding back the history of the universe, is practically impossible.

  But time travel might be attainable in the special case of oscillating time, which would prove the oscillating time hypothesis.

Seattle 1

- The Casimir apparatus excludes the random events associated with virtual particles, so a beam of light in the Casimir cavity might oscillate further in time, making it move out of synchrony with a beam passing through the conventional vacuum.



Seattle 1

- The oscillations might sum to zero, giving no net effect.
- The Casimir cavity might have a lower optical density than the normal vacuum, allowing light in the cavity to travel faster than the speed of light in a normal vacuum, thereby causing a beat frequency.
- The effect of time oscillations might be too small to measure.

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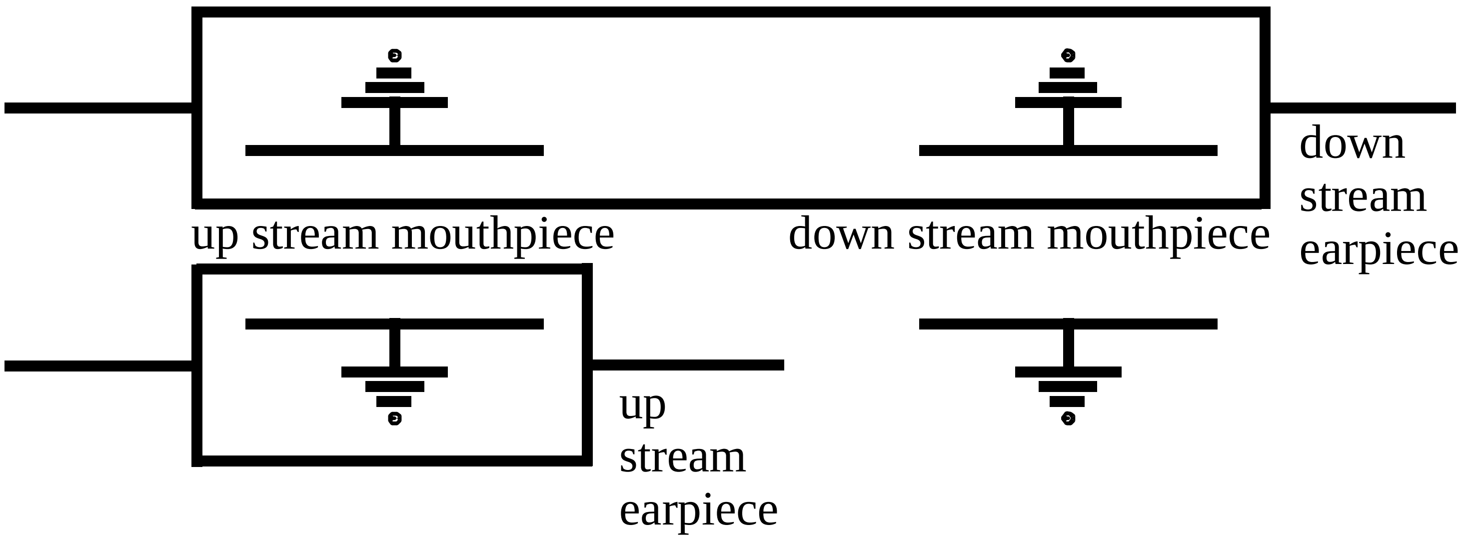
Seattle 2

- Modulating the plates as a mouthpiece sends a signal in elapsed time. In this configuration the up stream telephone in the past talks to the down stream telephone in the future.
- The downstream telephone sends a signal to the upstream one in the past via time-flow oscillations.

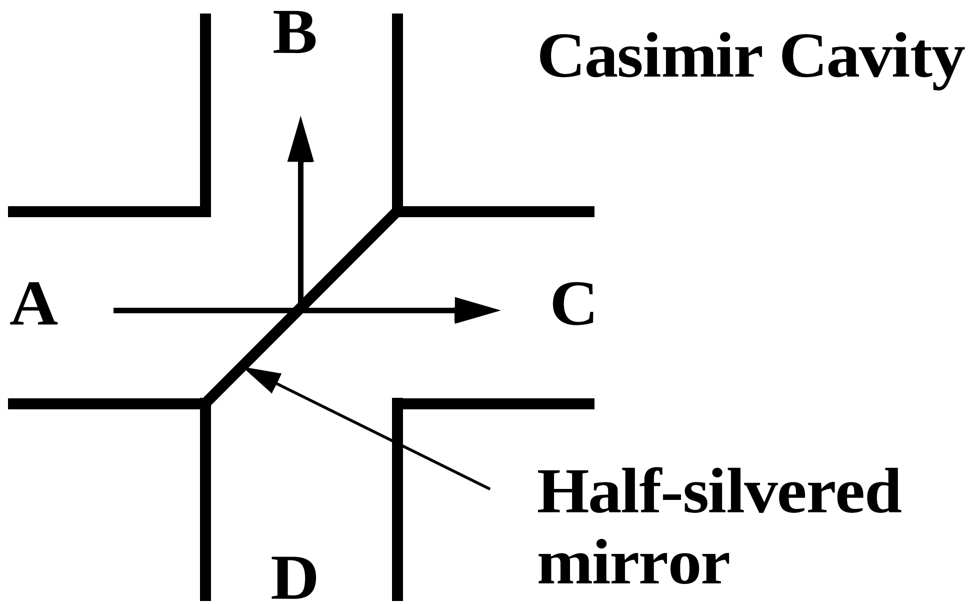


Seattle 2

- The effect of transmitting a signal the wrong way along a beam of light would be a clear indication of time travel,
- But the effect might be too small to measure,
- And the effect might be swamped by interference with particles travelling forward in time.

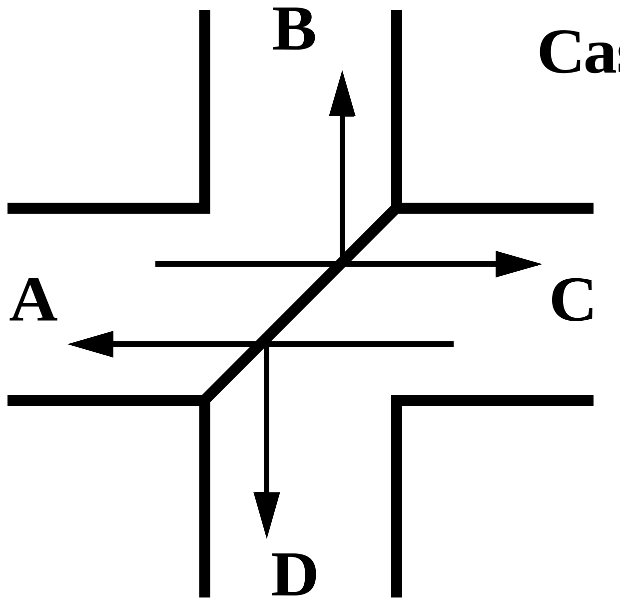
Reading 1

If standard time symmetry holds then light from source A will be detected at sink B and C, but not D, even in the presence of time-flow oscillations.



Reading 1

If the new model of time holds then light from source A will be detected at sink B, C, and D (and also A).



Casimir Cavity

Reading 1

- Use a series of these devices so that many intensities of light are involved, down to a single photon, so that both macro and quantum events are tested.
- Use a pulsed laser source at A to minimise interactions between particles moving forward and backward in time and to simplify measurement of arrival times.
- Measure the arrival times at C and D. If light at D has travelled backwards in time then it will arrive earlier than light at C.
- Construct the devices, using existing lithographic techniques, in pure, doped, or gold-plated silicon to achieve a reasonable proportion of the Casimir effect.

Conclusion

- Is the proposal that time is made up of oscillating time and elapsed time original?
- Are the qualitative explanations of physical phenomena plausible?
- Are there other physical phenomena that might be explained?
- Does the experiment, Reading 1, seem feasible?