# How to build a time machine



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### Why time machines?



- Fun
- Fear
- Fhysics

## Plan

- Plot devices
- Patents
- Physics
- Pthought experiments
- Present state of time machine research

## Plot Devices



To anyone but a genius the problem would have been insurmountable. - Mr. Peabody

#### Going back to the Well



`Clearly,' the Time Traveller proceeded, `any real body must have extension in four directions: it must have Length, Breadth, Thickness, and--Duration. But through a natural infirmity of the flesh, which I will explain to you in a moment, we incline to overlook this fact. There are really four dimensions, three which we call the three planes of Space, and a fourth, Time. There is, however, a tendency to draw an unreal distinction between the former three dimensions and the latter, because it happens that our consciousness moves intermittently in one direction along the latter from the beginning to the end of our lives.'



• "It happened," the hoarse voiceless gasp went on, "that Gyronchi was the first future world, out of those possible, that the chronoscope revealed. Happened that I found Sorainya, splendid in her armor, fencing with one of her human ants."

### l'm a doctor, not a time traveller





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## Handheld/ Watch



11/21/2008

Time

01111

III

### Bare essentials of time travel



11/21/2008

## Physics break



## Block universe





BLOCK UNIVERSE: All times are equally real

## Evolving universe

## Closed timelike curves



CLOSED TIMELIKE CURVE can be formed if space-time loops around. Entering such a curve tomorrow and moving forward in time, we can end up at today. Ground-hog day Deju Vu Cause & Effect

. . .

### Paradox noise



#### "YOUR ONLY CHANCE LIES IN PREVENTING THE ASSASSINATION OF PRESIDENT ABRAHAM LINCOLN . . . "

#### "What?"

A burst of audio and visual static reduced reception to unintelligible noise. Then the paradox-generated interference was gone again, as suddenly as it had come.

### Greenberger & Svozil



According to our model, if you travel into the past quantum mechanically, you would only see those alternatives consistent with the world you left behind you. In other words, while you are aware of the past, you cannot change it. No matter how unlikely the events are that could have led to your present circumstances, once they have actually occurred, they cannot be changed. Your trip would set up resonances that are consistent with the future that has already unfolded.

### Bootstrap paradoxes



An engineer goes 30 years into the future, reads some patents a later version of himself has filed, takes the (knowledge in the) patents back, and files them.
When were the patents written?
Even with time travel, it should not be possible to create order without paying work

# Entropy

The law that entropy always increases holds, I think, the supreme position among the laws of nature. If someone points out to you that your pet theory of the universe is in disagreement with Maxwell's equations then so much the worse for Maxwell's equations....but if your theory is found to be against the second law of thermodynamics, I can give you no hope; there is nothing for it but to collapse in deepest humiliation. -- Eddington

## Patently absurd



You canna go against the laws of physics, laddie! -- well-known engineer

## Time machine

Patent Application Publication Apr. 6, 2006 Sheet 2 of 2

US 2006/0073976 A1



A method for employing sinusoidal oscillations of electrical bombardment on the surface of one Kerr type singularity in close proximity to a second Kerr type singularity in such a method to take advantage of the Lense-Thirring effect...

# Jul. 4, 2002 Sheet 1 of 4 Patent Application Publication US 2002/0085661 A1

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# Faster than light

A propulsion system for a space vehicle is designed as a fully self-contained system which does not eject particles to effect the propulsion, referred to as a "reactionless drive". Propulsion is effected by changing the mass of rings of charged particles by acceleration of the rings of charged...



# Thought experiments

### Frame-dragging



### Gödel's rotating universe



"This and similar contradictions, however, in order to prove the impossibility of the worlds under consideration, presuppose the actual feasibility of the journey into one's past. But the velocities which would be necessary in order to complete the voyage in a reasonable time are far beyond everything that can be expected ever to become a practical possibility." – Gödel

### On Rotating Cylinders & the Possibility of Global Causality Violation



- Niven's Law:
- "If the universe of discourse permits the possibility of time travel, and of changing the past, then no time machine will be invented in that universe."

### Gott got it done with two strings



OK, cosmic strings.

TIMETRAVEL INEINSTEIN'S UNIVERSE J. Richard Gott THE PHYSICAL POSSIBILITIES OF TRAVEL THROUGH TIME

# General relativistic time machines



"General relativity is in fact infested with peculiar geometries that seem to produce time machines"

– Visser

## Acme Wormhole Construction Company



Visser's recipe for a time machine:

- 1. Acquire a traversable wormhole
- Induce a "time-shift" between the two mouths of the wormhole
- 2. Bring the wormhole mouths together

## Davies's How to Build a Time Machine



How do you go about constructing a traversable wormhole and turning it into a time machine?

### Mother of All Paradoxes

THE NOTORIOUS MOTHER PARADOX (sometimes formulated using other familial relationships) arises when people or objects can travel backward in time and alter the past. A simplified version involves billiard balls. A billiard ball passes through a wormhole time machine. Upon emerging, it hits its earlier self, thereby preventing it from ever entering the wormhole. RESOLUTION OF THE PARADOX proceeds from a simple realization: the billiard ball cannot do something that is inconsistent with logic or with the laws of physics. It cannot pass through the wormhole in such a way that will prevent it from passing through the wormhole. But nothing stops it from passing through the wormhole in an infinity of other ways.



## Time machines today

- A design for a quantum time machine
- Large Hadron Collider as time machine factory?
- The time traveller



## Practical thiotimoline



## Withdrawal pains



[v2] Sun, 8 Aug 2004 18:25:20 GMT (0kb,l)

Which authors of this paper are endorsers?

Link back to: arXiv, form interface, contact.

## Time Machine at the LHC

#### I.Ya. Aref'eva and I.V. Volovich

Recently, black hole and brane production at CERN's Large Hadron Collider (LHC) has been widely discussed. We suggest that there is a possibility to test causality at the LHC. We argue that if the scale of quantum gravity is of the order of few TeVs, proton-proton collisions at the LHC could lead to the formation of time machines (spacetime regions with closed timelike curves) which violate causality. One model for the time machine is a traversable wormhole. We argue that the traversable wormhole production cross section at the LHC is of the same order as the cross section for the black hole production. Traversable wormholes assume violation of the null energy condition (NEC) and an exotic matter similar to the dark energy is required. Decay of the wormholes/time machines and signatures of time machine events at the LHC are discussed.

## If LHC is a Mini-Time-Machines Factory, Can We Notice?

- energy spectrum changes
- anomalously energetic particles
- acceleration of particle decays
- unitarity violation
- collective effects

Mironov, Morozov, & Tomaras

## Mallett - time traveller



- ring laser
- frame dragging



Fig. 2. Single ring configuration.



Fig. 3. Ring stack configuration.

# Squareshaped ring laser



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### I have no doubt that in reality the future will be vastly more surprising than anything I can imagine. Now my own suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose. – J. B. S. Haldane

## References



- http://xxx.lanl.gov/find/
- http://scholar.google.com/
- <u>http://www.google.com/</u>
   <u>patents</u>

References II

- The End of Time Julian Barbour
- Time Travel in Einstein's Universe J.
   Richard Gott
- Physics of the Impossible Michio Kaku
- Time Traveler Ronald L. Mallett
- Time's Arrow & Archimedes' Point Huw Price
- Timeless Reality Victor J. Stenger
- The New Time Travelers David Toomey