



The Mechanisms of

Time

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Overview



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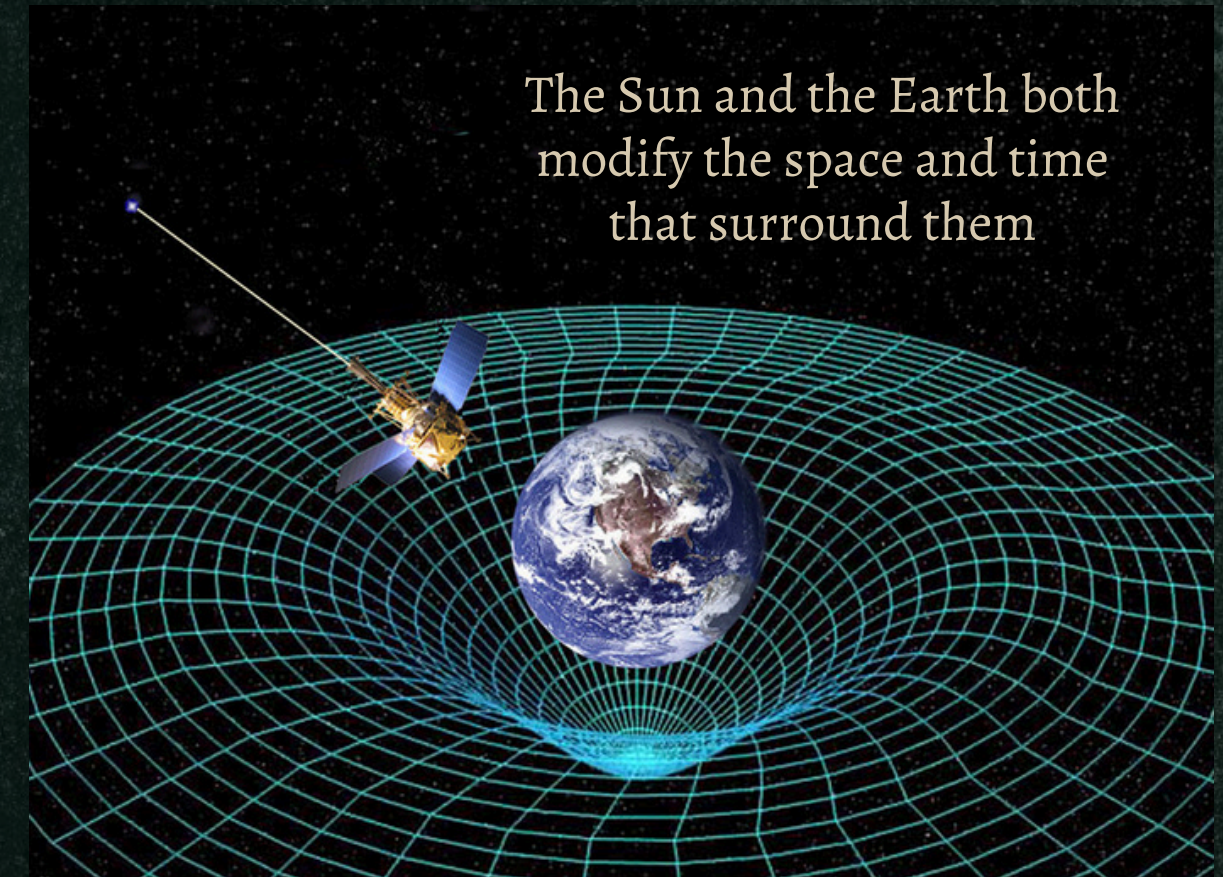
Time in Science

Discussing physics surrounding time



About Time

In General



The Sun and the Earth both
modify the space and time
that surround them

A mechanism similar to when a
body immerses in water and
displaces the water around it

That in turn affects the
movement of bodies, causing
them to 'fall' towards each other

- I. Time passes faster in the mountains than it does at sea level.
- II. A clock placed on the floor runs a little more slowly than one on a table.
- III. Lower down, all processes are slower - a person who lives in the mountains ages faster, while the person who lives in the plains ages slower (because less time has passed).

Why?

Conclusion

A mass slows down time around itself. Time flows slower in plains than in the mountains because they are closer to the Earth.



Which clock shows the 'true time'?

There is no true time.

Every point in space has its own time that changes relatively to the others.



We do not describe how the world evolves in time, but how local times evolve in relation to each other.

It is a network of events affecting each other.



Past and Future



lilie_dovie on Pinterest

Past	Future
We cannot alter the past - only experience regrets, remorse, and memories.	Uncertainty, anxiety, open space. We can move towards it and give it form.
Time is not a line extending equally in both directions - it is an arrow with distinct ends.	

The difference between past and future, between cause and effect, between memory and hope, between regret and intention... in the elementary laws that describe the mechanisms of the world there is no such difference.





Time and Heat

*Every time a difference is
manifested between the past and
the future, heat is involved.*





The second law of thermodynamics

The state of entropy of the entire universe, as an isolated system, will always increase over time. The second law also states that the changes in the entropy in the universe can never be negative.

In other words:

Entropy measures the disorder in a system, and the second law of thermodynamics says that this disorder in the universe always increases over time.

How does it relate to time?



THE
LONDON, EDINBURGH AND DUBLIN
PHILOSOPHICAL MAGAZINE
AND
JOURNAL OF SCIENCE.
[FOURTH SERIES.]
JULY 1851.

I. *On the Moving Force of Heat, and the Laws regarding the Nature of Heat itself which are deducible therefrom.* By R. CLAUSIUS*.

THE steam-engine having furnished us with a means of converting heat into a motive power, and our thoughts being thereby led to regard a certain quantity of work as an equivalent for the amount of heat expended in its production, the idea of establishing theoretically some fixed relation between a quantity of heat and the quantity of work which it can possibly produce, from which relation conclusions regarding the nature of heat itself might be deduced, naturally presents itself. Already, indeed, have many instructive experiments been made with this view; I believe, however, that they have not exhausted the subject, but that, on the contrary, it merits the continued attention of physicists; partly because weighty objections lie in the way of the conclusions already drawn, and partly because other conclusions, which might render efficient aid towards establishing and completing the theory of heat, remain either entirely unnoticed, or have not as yet found sufficiently distinct expression.

The most important investigation in connexion with this subject is that of S. Carnot†. Later still, the ideas of this author have been represented analytically in a very able manner by Clapeyron‡. Carnot proves that whenever work is produced by heat, and a permanent alteration of the body in action does not at the same time take place, a certain quantity of heat passes

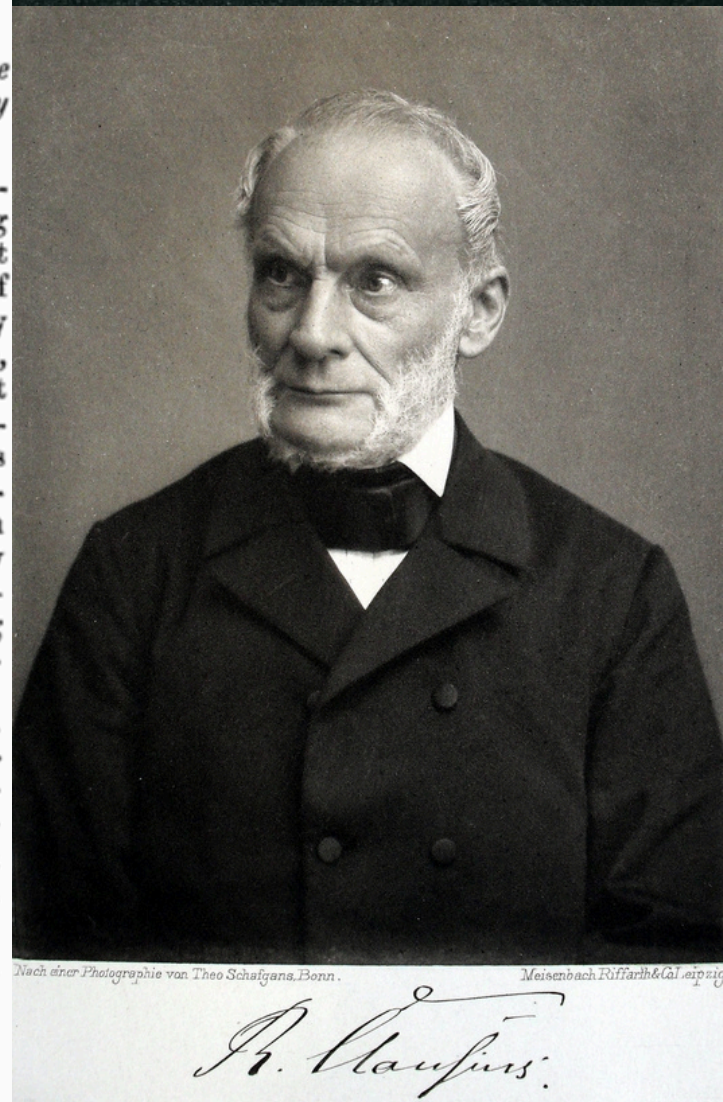
* Translated from Poggendorff's *Annalen*, vol. lxxix. p. 368.

† *Reflexions sur la puissance motrice du feu, et sur les Machines propres à développer cette puissance*, par S. Carnot. Paris, 1824.

‡ *Journ. de l'École Polytechnique*, vol. xix. (1834); and Taylor's Scientific Memoirs, Part III. p. 347.

Second law of thermodynamics explains how it is impossible for heat to pass from a cold body to a hot one.

It was discovered by Prussian professor Rudolf Clausius and published in 1850 in his paper *On the Moving Force of Heat*.



A ball may fall, but it can also come back up, by rebounding, for instance. Heat cannot.

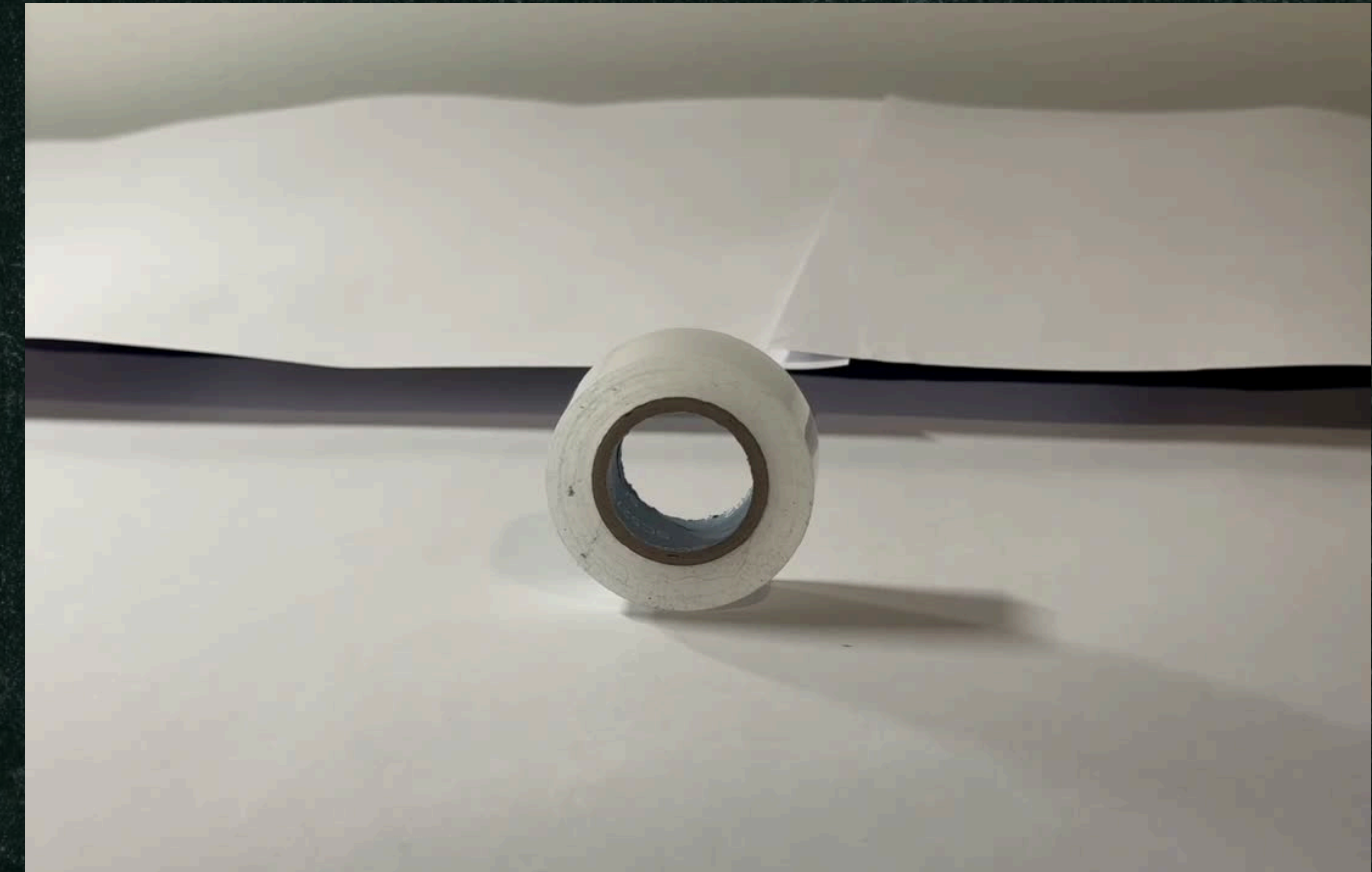
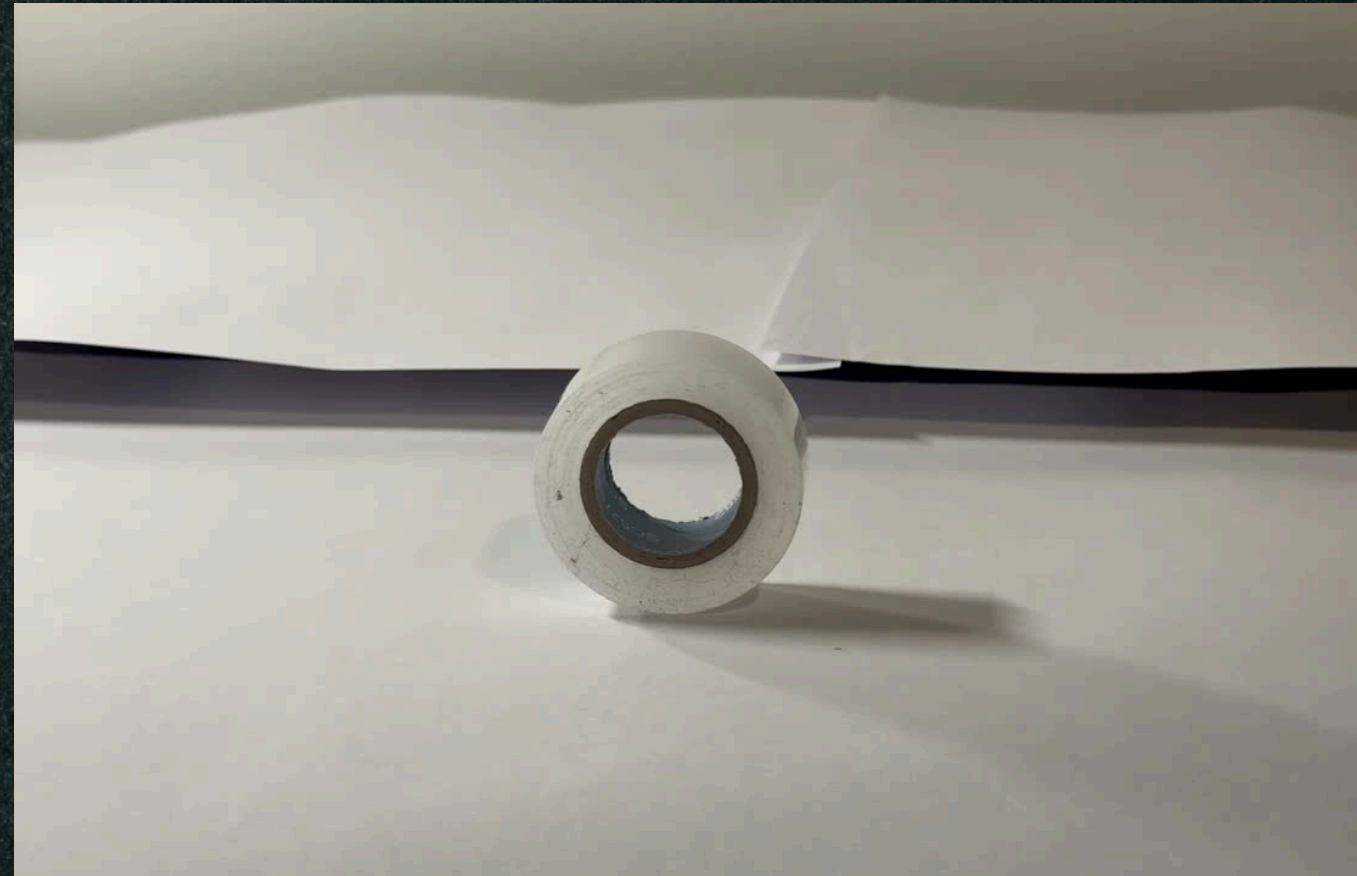
This is the only basic law of physics that distinguishes the past from the future. None of the others do so.



Whenever a distinction appears between past and future, heat is involved; in every sequence of events that makes no sense in reverse, something is heating up.



Visualization



Explanation:

It is possible to tell which video is projected correctly and which one is in reverse only because the tape stops. When played backwards it shows an impossible event, which is tape beginning to roll on its own.

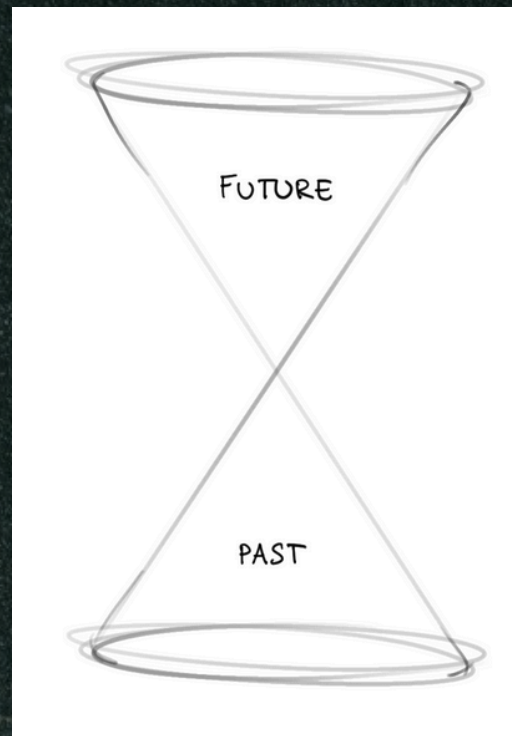
The tape slows down and stops because of friction, and friction is the source of heat.

Conclusion

Only when heat is present, are we able to distinct the past from the future.



Light cone



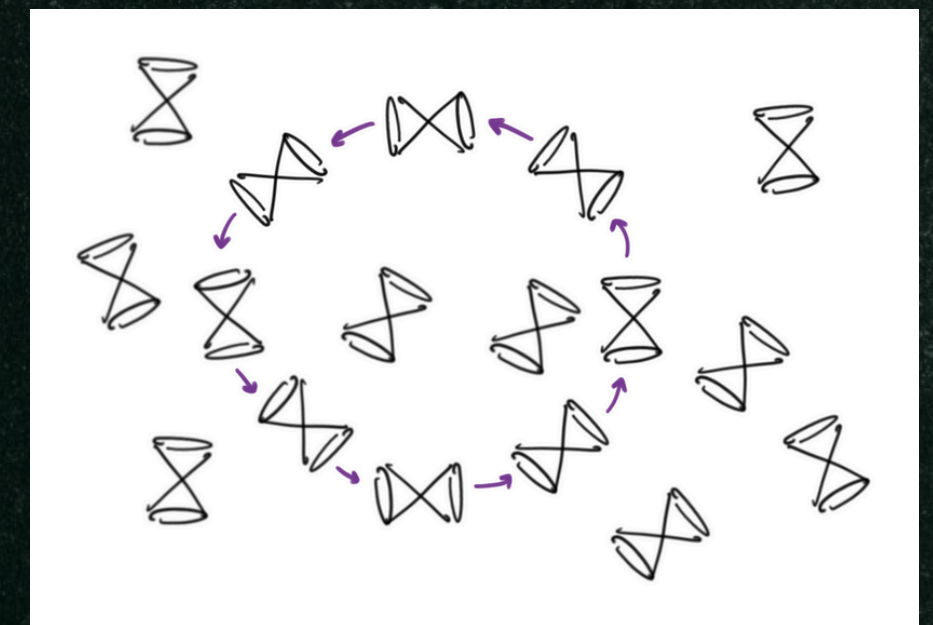
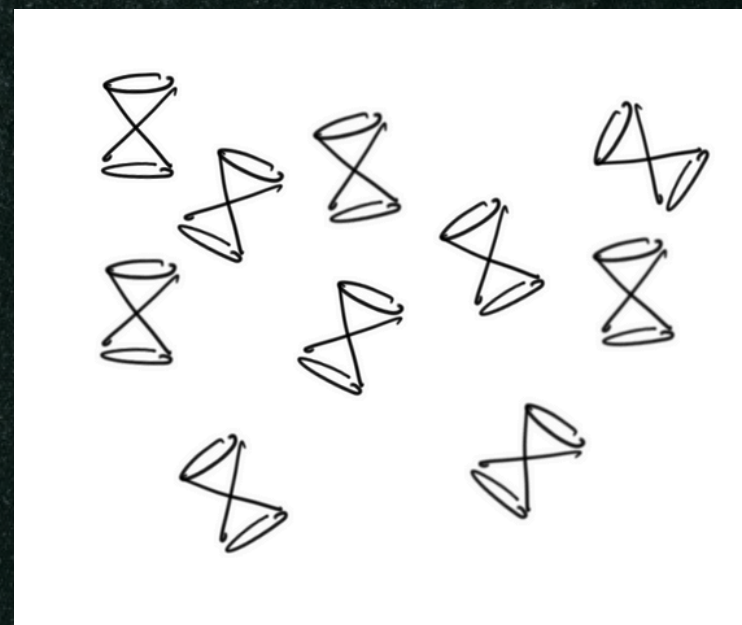
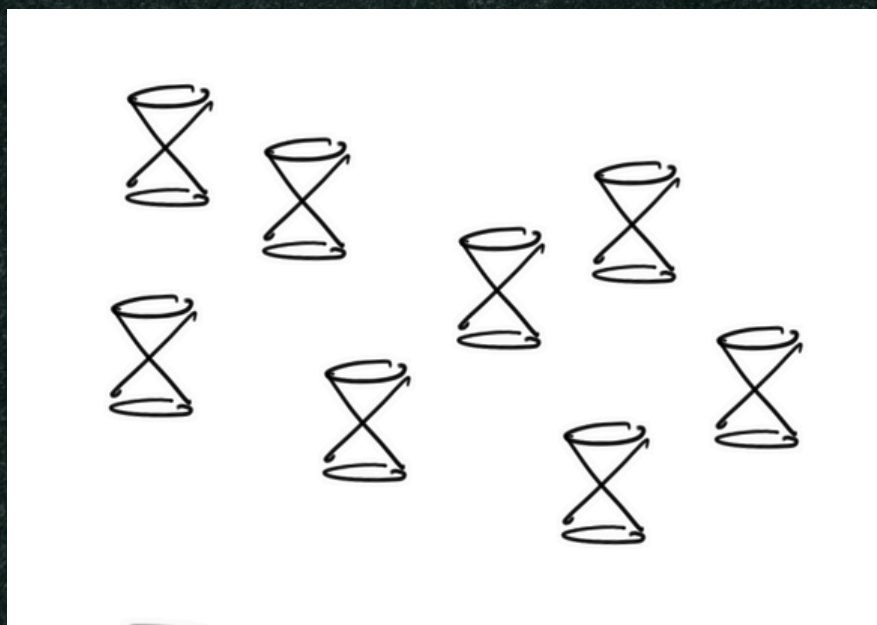
What is *Now*?

And does it exist?

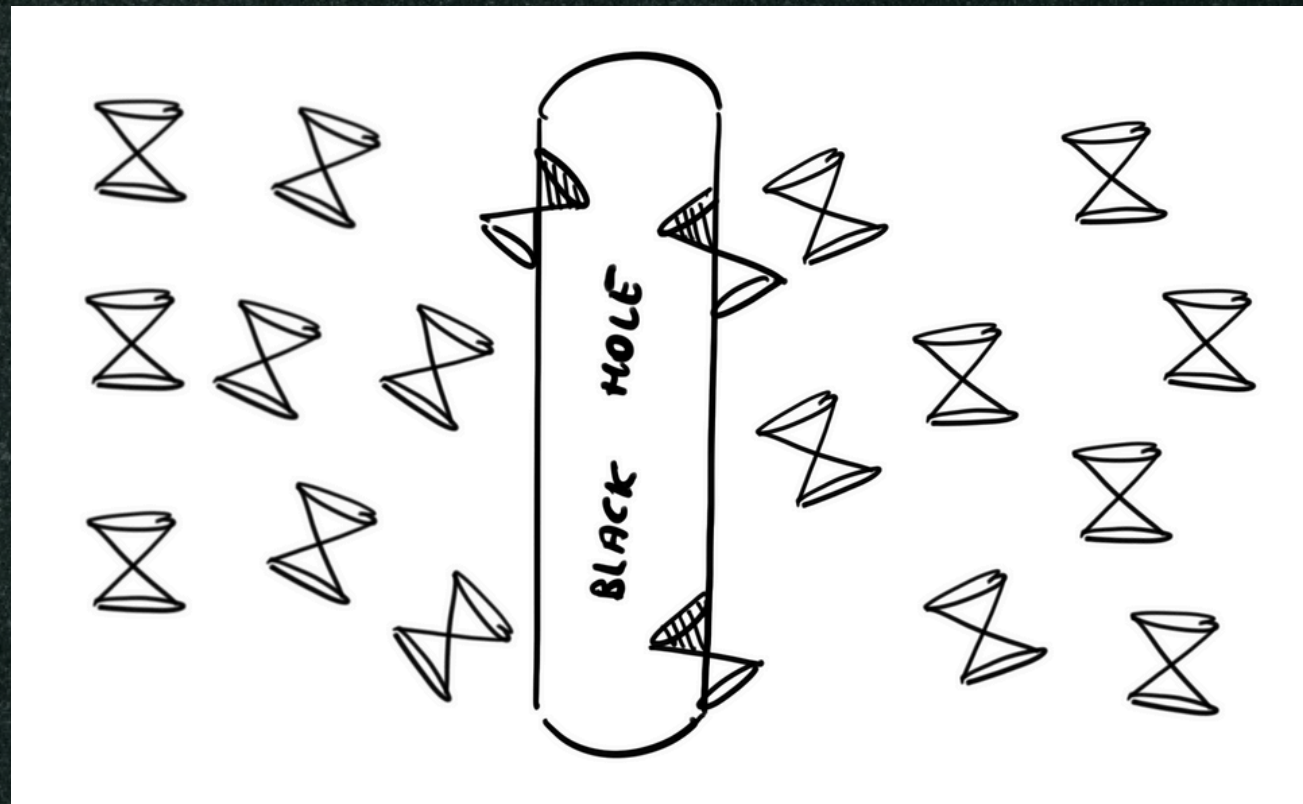
All events follow their own order, which is independent from other sequences of orders ('partial order').

However, the speed of time flow is different in every place. Spacetime does not have the order showed presented before but can be distorted.

There is a possibility of cones always advancing towards the future and returning to the same point in spacetime.

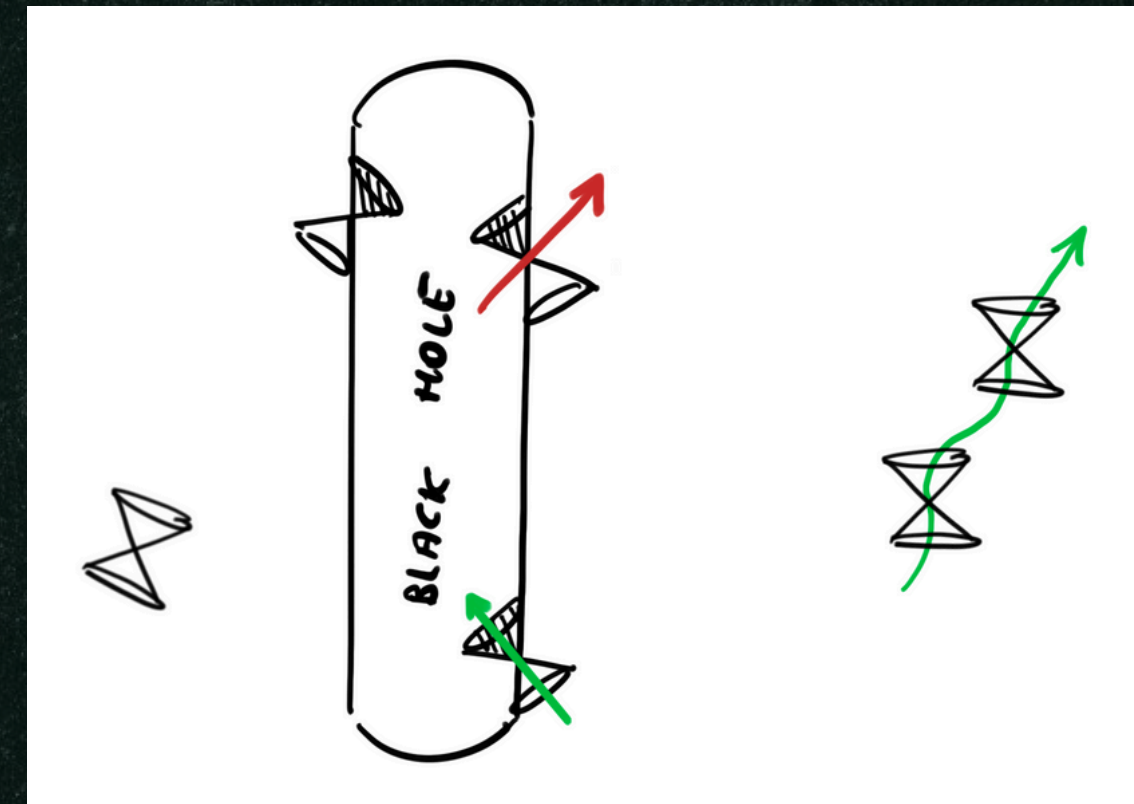


What happens near a black hole?



Mass of the black hole slows time to such a degree that, at its border (called the 'horizon'), time stands still.

That also causes the lines to converge towards it, as presented in the diagram.



In order to exit from a black hole, one would have to move towards the present and not towards the future, which is impossible. Objects can only move towards the future.

Basically, a black hole is a closed off region of space in the future from everything that surrounds it.



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Time in Culture

Examples of different takes on time

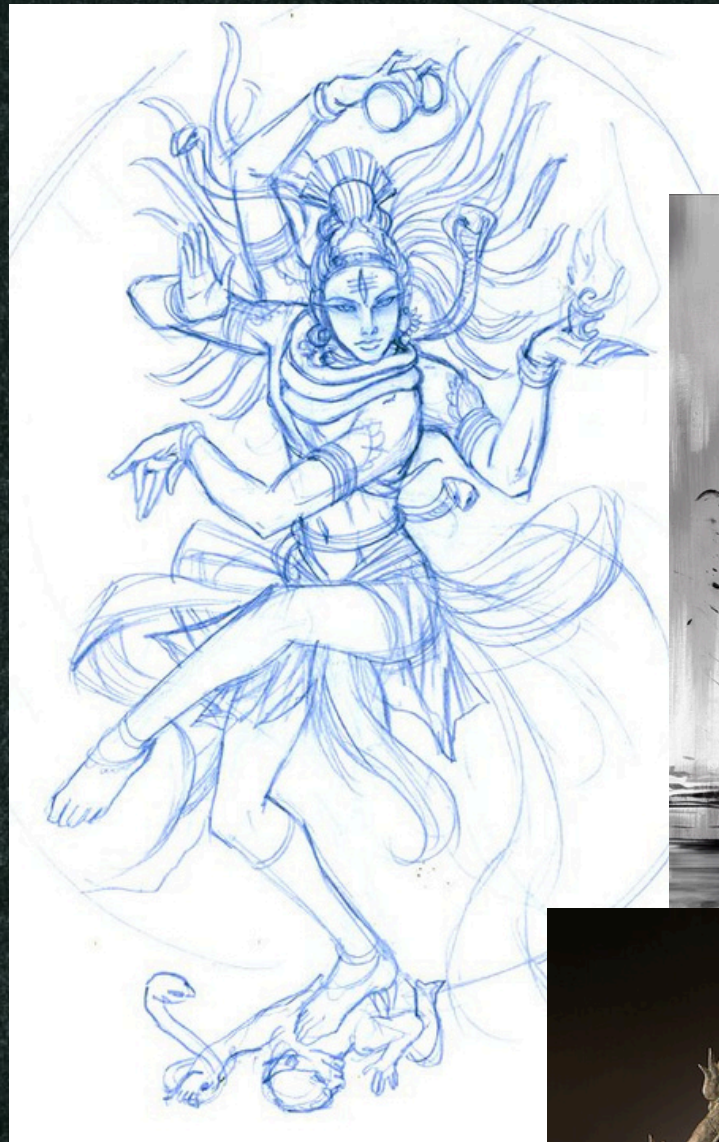
Time in Hindu Mythology

Dancing Shiva

Nataraja - the Hindu god Shiva in his form as the cosmic dancer

In the Nataraja sculpture, Shiva is depicted as the origin of all cosmic motion and as the deity whose apocalyptic dance - symbolized by the arch of flames - signifies the dissolution of the universe at the end of an era.

Shiva's dance supports the coursing of the universe - it embodies the very flow of time itself.



Interstellar (2014)

The movie portrays time as a force that shapes characters' lives, their choices, and their relationships. Because time passes differently in different places, the film explores how love, sacrifice, and regret are influenced by those temporal shifts.

Time is shown as relative, not absolute - particularly through the effect of gravity. It also acts as an emotional barrier and becomes a physical dimension.

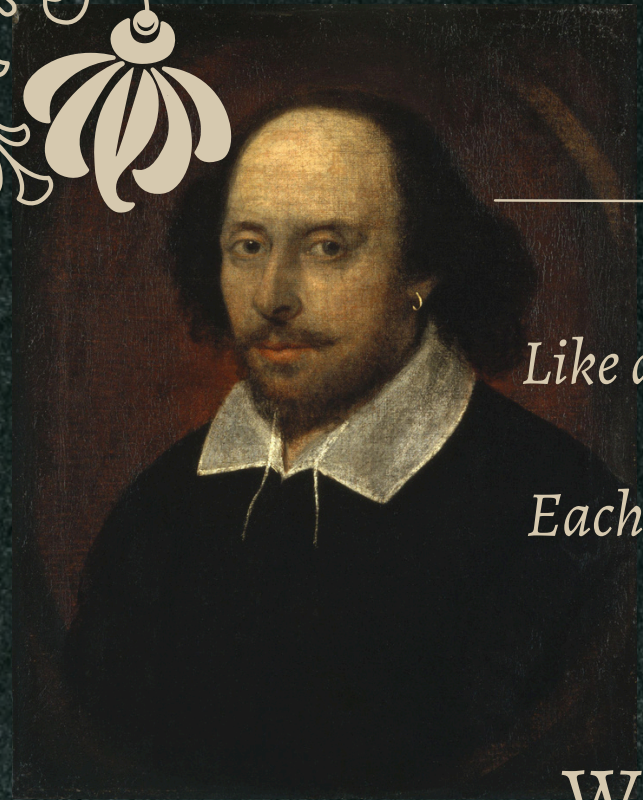


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Time in Poetry

How do we express our feelings about time?



*Like as the waves make towards the pebbl'd shore,
So do our minutes hasten to their end;
Each changing place with that which goes before,
In sequent toil all forwards do contend.*

—William Shakespeare - *Sonnet 60*

- Expresses the wish for time to disappear in order to create a utopian world
- Tells the time to glut itself until it is full - the reason for that is because it will “eat” all that is false and vain. The only things the humanity will lose are of no real worth

• The sonnet attempts to explain the nature of time as it passes using metaphorical descriptions

• Compares minutes to waves

• Each minute taking the place of that which came before in a regular sequence



*And glut thy self with what thy womb devours,
Which is no more then what is false and vain,
And meerly mortal dross;
So little is our loss,
So little is thy gain.*

—John Milton - *On Time*



Resources

Time in Science

Rovelli, C. (2019). The Order of Time. Penguin Books.

Photos

- ☞ Globe bending the spacetime - <https://dailytimes.com.pk/612790/do-astronauts-age-slower-than-the-rest-of-us-here-on-earth>
- ☞ Network of Events - home_resipe_me on Pinterest
- ☞ Clock with emotions - lilie_dovie on Pinterest

Time in Art

Photos

- ☞ Nataraja from Tamil Nadu, India. Chola Dynasty - <https://en.wikipedia.org/wiki/Nataraja>
- ☞ Shiva Nataraja WIP - ninjafaun on DeviantArt
- ☞ Shiva Tandav - Uniquely_Creative on Pinterest

