

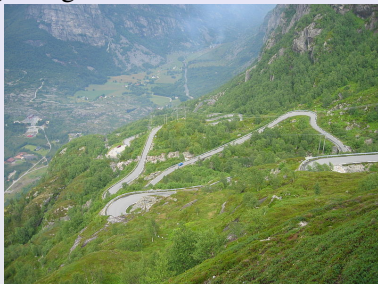
Time  
Relativity  
and God



# The relationship between God and Time

Augustine of Hippo:

- Time exists only within the created universe, so that God exists outside time;
- For God there is no past or future, but only an eternal present;
- Imagine a man walking along a road.

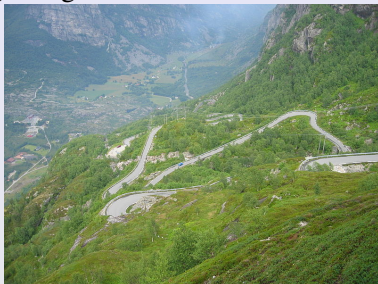


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- The woman on a mountainside and see all the road.
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# Are you a Deist or Theist?

- **Deism:**

God (or gods) created the universe but does not alter the original plan for the universe.

He know the past and future of the universe.

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God (or gods) created the universe and continues to play an active roll in it.

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“Sun, stand still over Gibeon; And Moon, in the Valley of Aijalon.”  
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## Jonah 3 5-10

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*Let neither man nor beast, herd nor flock, taste anything; do not let them eat, or drink water. But let man and beast be covered with sackcloth, and cry mightily to God; yes, let every one turn from his evil way and from the violence that is in his hands. Who can tell if God will turn and relent, and turn away from His fierce anger, so that we may not perish?*

*Then God saw their works, that they turned from their evil way; and God relented from the disaster that He had said He would bring upon them, and He did not do it.*

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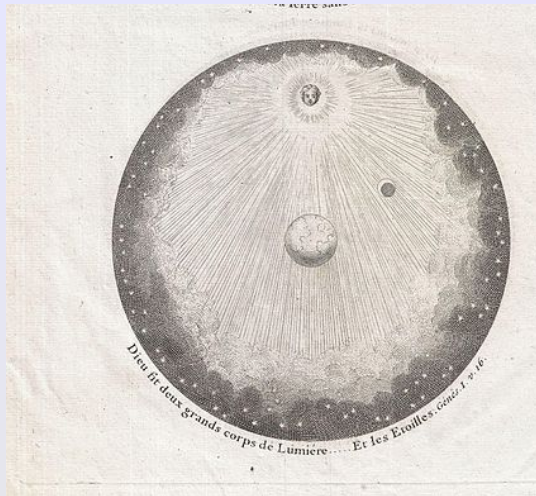
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## A Small God



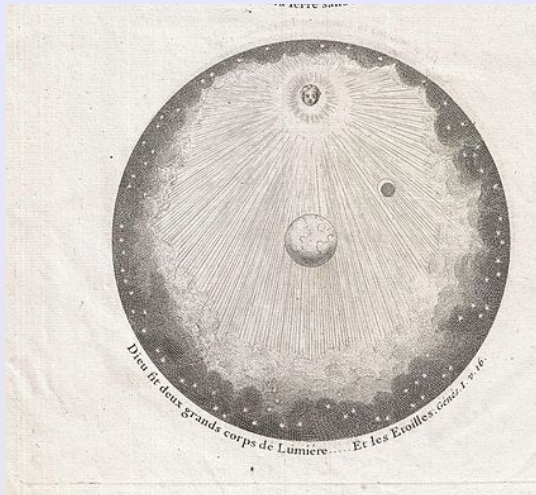
- A truly small God. Zeus having been trick by Hypnos, the god of sleep wakes up.
- He can use is all powerful eyes he sees instantly all that is happening on the battle field between the Greeks and the Trojans.

## Large God



- As our knowledge of the universe has increased. So the power of our gods increases.
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# Newtonian Mechanics

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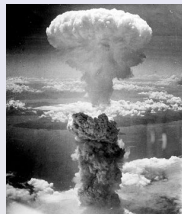
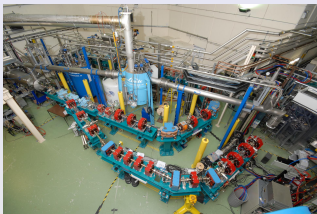
# Relativity

- Einstein theory of relativity (Special and General) says that space and time are combined into a single entity called spacetime.
- The speed of light (in a vacuum) is the same for everyone.
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● Neutrinos?

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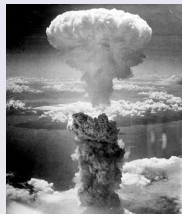
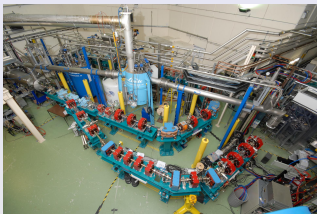
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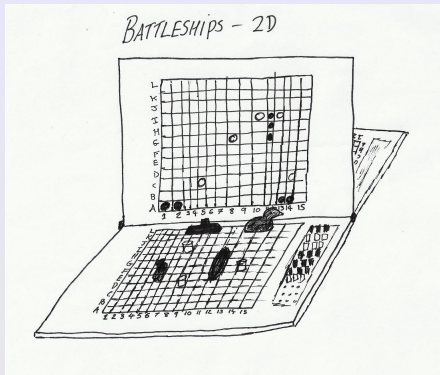


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# Battleships

- Before talking about spacetime, let's look at dimensions.
- We say space is 3-dimensional. That is we need 3 numbers to specify a point in space.



- In the game “Battleships” one must indicate to the position of the intended target by specifying two numbers. The distance east  $x$ , followed by the distance north  $y$ . This is because the game takes place on a two dimensional surface, i.e. the surface of the sea

# Battle Submarines



- In Battle Submarines, you need three numbers  $x$ ,  $y$  and  $z$  to specifying the position.

# Spacetime

- When we combine space and time, we create a 4-dimensional object called spacetime.
- A single point in spacetime is called an event. It requires four numbers to specify it.
  - 3 numbers to give the point in space
  - 1 number to give the time it happens.
- For example an important event in my life:
  - Bromley hospital ( $51.4070^{\circ}\text{N}$   $0.0210^{\circ}\text{E}$ )
  - 8 meters high (Third floor)
  - Midnight 1<sup>st</sup> May 1968
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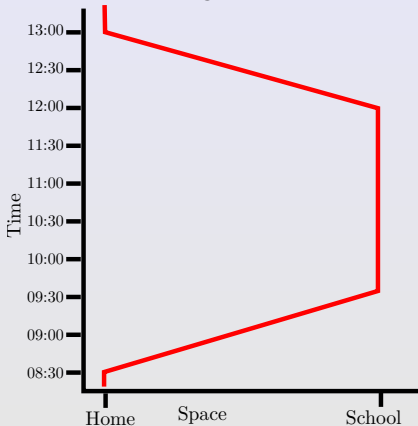
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# Spacetime diagrams

- **Space and time have the same footing in Special Relativity.**
- Consider Bob. His home and school are 4km apart on a straight road.  
One day he leaves his home at 8:30am and walks to school which takes 1 hour. (He is late)  
He stays at school until 12pm and then walks home.
- His spacetime diagram for the morning looks like.

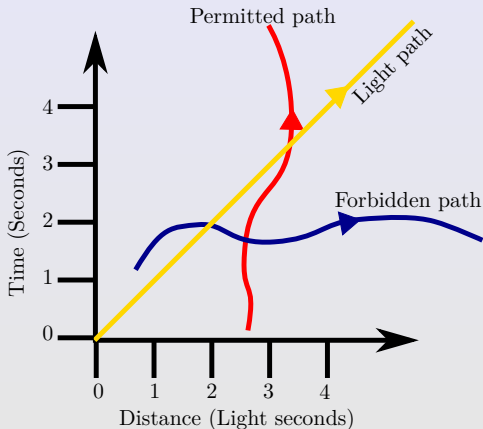
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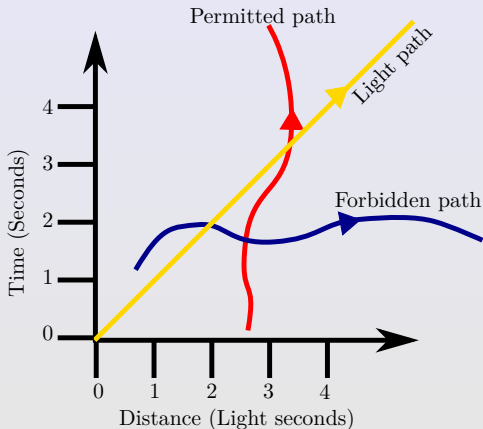
## Spacetime diagrams

- In special relativity we label the vertical axis time  $t$  (in seconds) and the horizontal axis displacement  $x$  (in light seconds).
- Given these axes, then light travels on  $45^\circ$  diagonal lines.
- Every object with mass must travel along curves with slopes above  $45^\circ$ .
- Nothing can travel faster than light, so nothing can travel along paths with slopes below  $45^\circ$ .



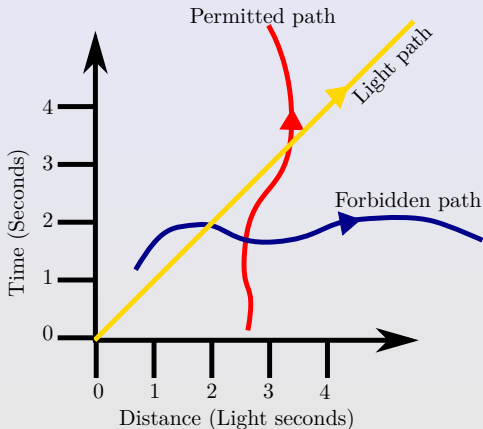
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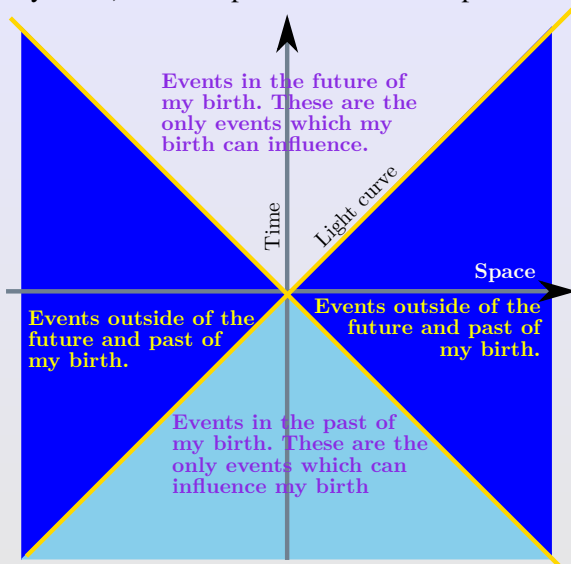
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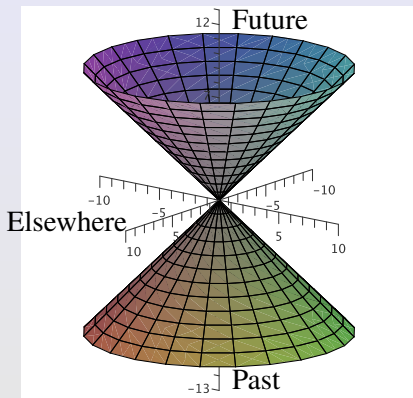
# Spacetime diagrams

- An event (e.g. my Birth) divides spacetime into three parts.



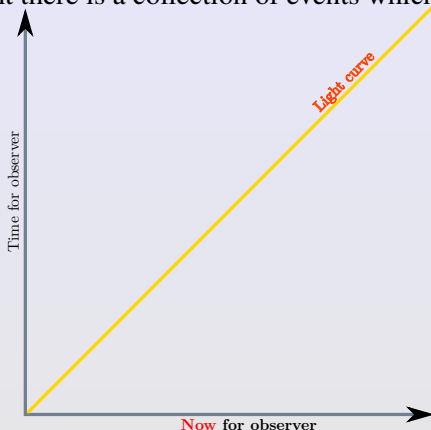
## Spacetime diagrams

- But space has three dimensions  $(x, y, z)$  therefore spacetime has four dimensions  $(t, x, y, z)$
- However I can only draw three dimensions so I shall draw one of time and two of space  $(t, x, y)$ .
- The division of spacetime in future, past and elsewhere of a point is a double cone, called **the lightcone**.



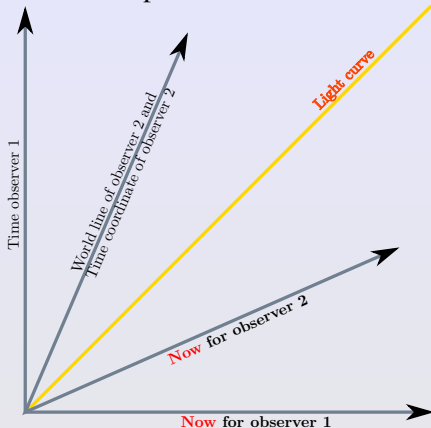
# The space of **Now**

- In special relativity, there is a notion of **Now**.
- That is for each event there is a collection of events which “at the same time”.



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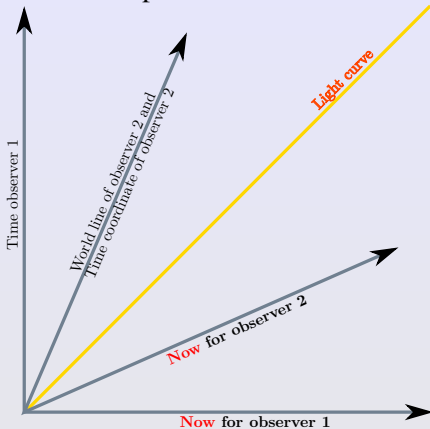
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## Theism: Gods Time.

- In Newtonian Mechanics, God's time was easy. God's time was our time.
- In Relativity there is a problem.
- If God is in time, then He must choose His TIME

- Of course God could choose any time.
- Should we not be able to detect Gods time?

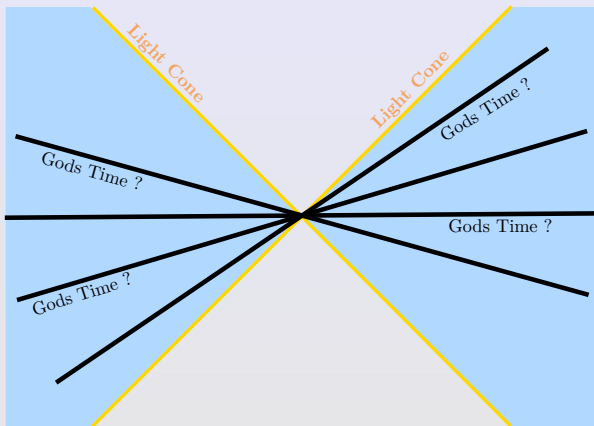
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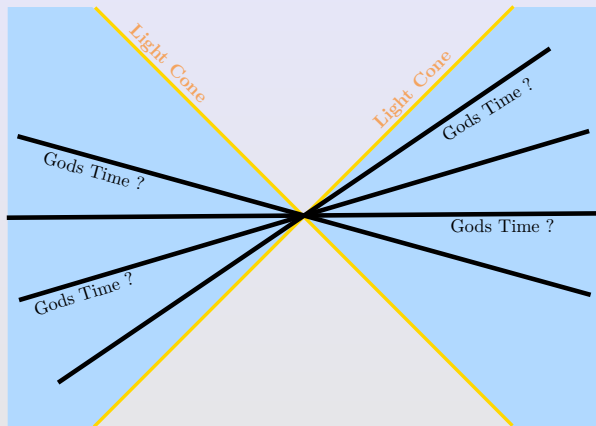
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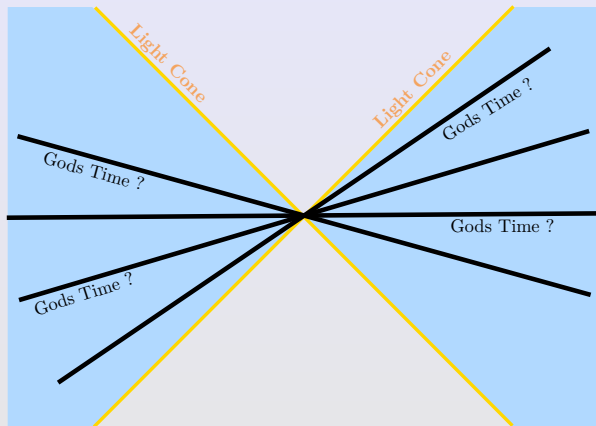
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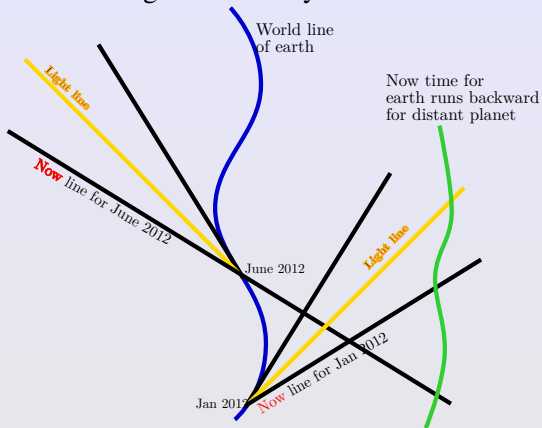
## Just pick out time

- An easy solutions: Can we not simply pick our time?
- But the earth moves. It changes its velocity.

- It moves at 108,000 km/h though space.
- Thus about 3 billion light years away:  
The **Now** will be going backwards in time.

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# General Relativity

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- It is one of most beautiful theories in Physics.
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  - Special relativity is taught in first and second year undergraduate physics.
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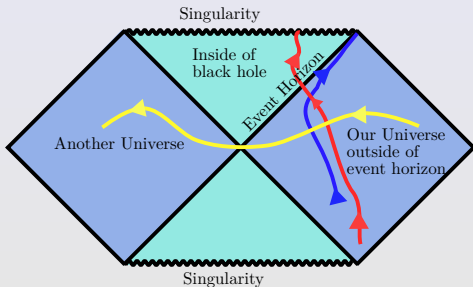
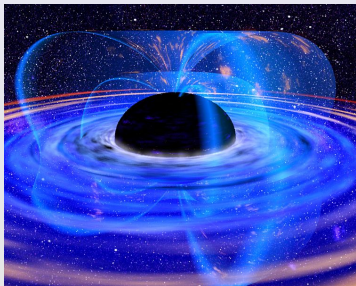
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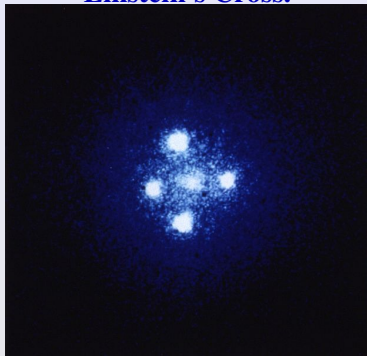
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## General Relativity: God's time

- Here the problem is even worse.
- The **Now** depends on the path.
- A star with a massive object in between will have several **"Now"**s.

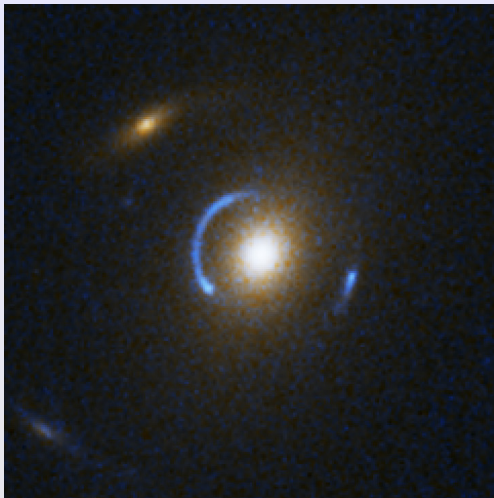
### Einstein's Cross.



Hubble Space Telescope has provided astronomers with the most detailed image ever taken of the gravitational lens G2237 + 0305.

The photograph shows four images of a very distant quasar which has been multiple-imaged by a relatively nearby galaxy acting as a gravitational lens.

## Einstein Ring

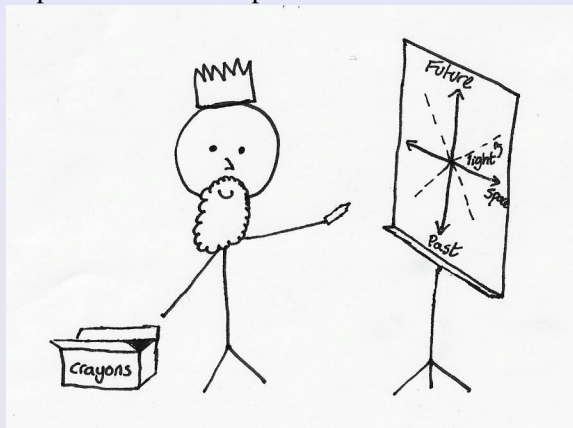


Einstein ring formed by gravitational lens, Object SDSS J120540.43+491029.3 found on the SLOAN Digital Sky Survey.

Image by the Hubble Space Telescope

## Deism is the answer?

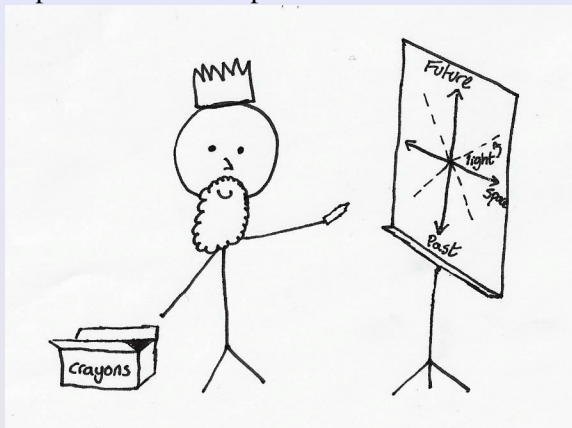
- God now gazes upon the whole of spacetime.



- But now the future is fixed.
- We may pray for comfort, but we can no more pray for something in the future than pray for God to change something in the past.

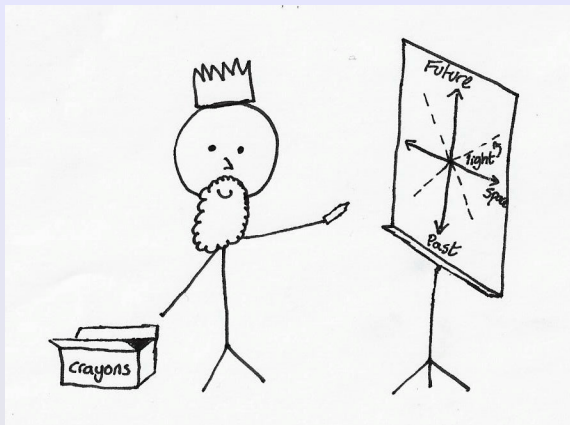
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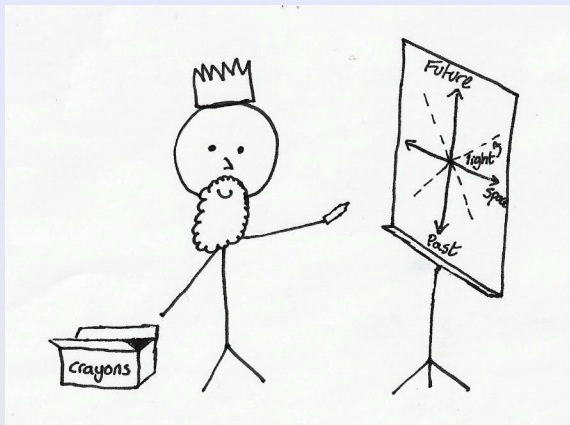
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# Higher Dimensions



- Such a God would live in a higher dimensional universe.
- Our universe has 4 dimensions.
- He needs at least 5.
- But does He have His own experience of time. Then He would live in a 6 dimensional universe.

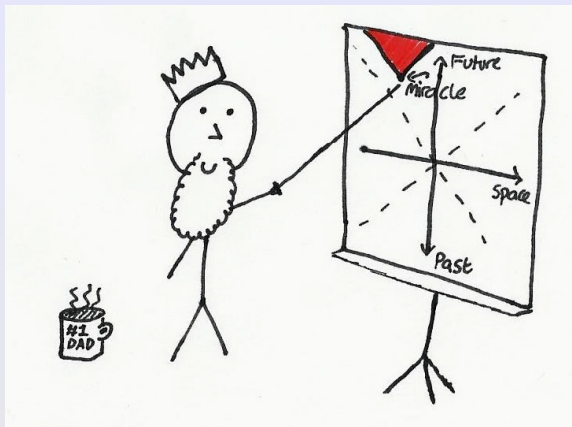
# Higher Dimensions



- Such a God would live in a higher dimensional universe.
- Our universe has 4 dimensions.
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# Deism, Miracles

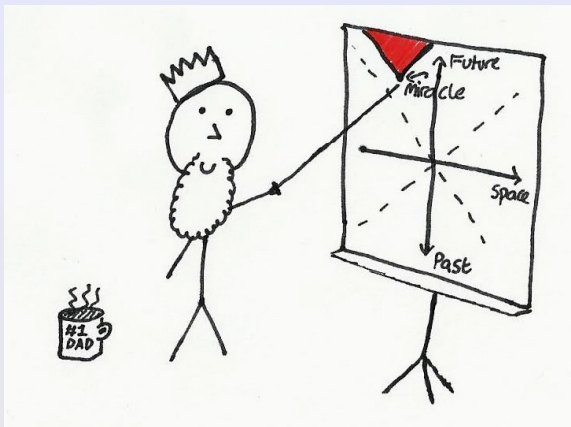
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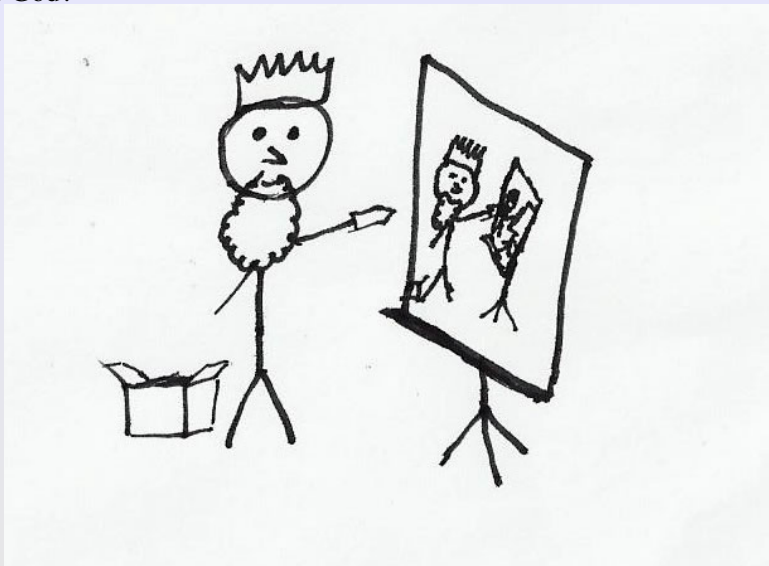
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# Ad infinitum

- God's God?



## Summary

- Theist who talk about God and Time, usually assume a Newtonian point of view. That everybody's time and God's time is the same.
- But we have known for over 100 years that this is not the case.
- The idea of God out of time is an old one. But this also has problems.

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