

# 10 mysteries that physics can't answer... yet

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From why we travel forwards in time to how bicycles travel forwards at all, we present the questions great and small that our finest minds can't explain



## COSMOLOGY

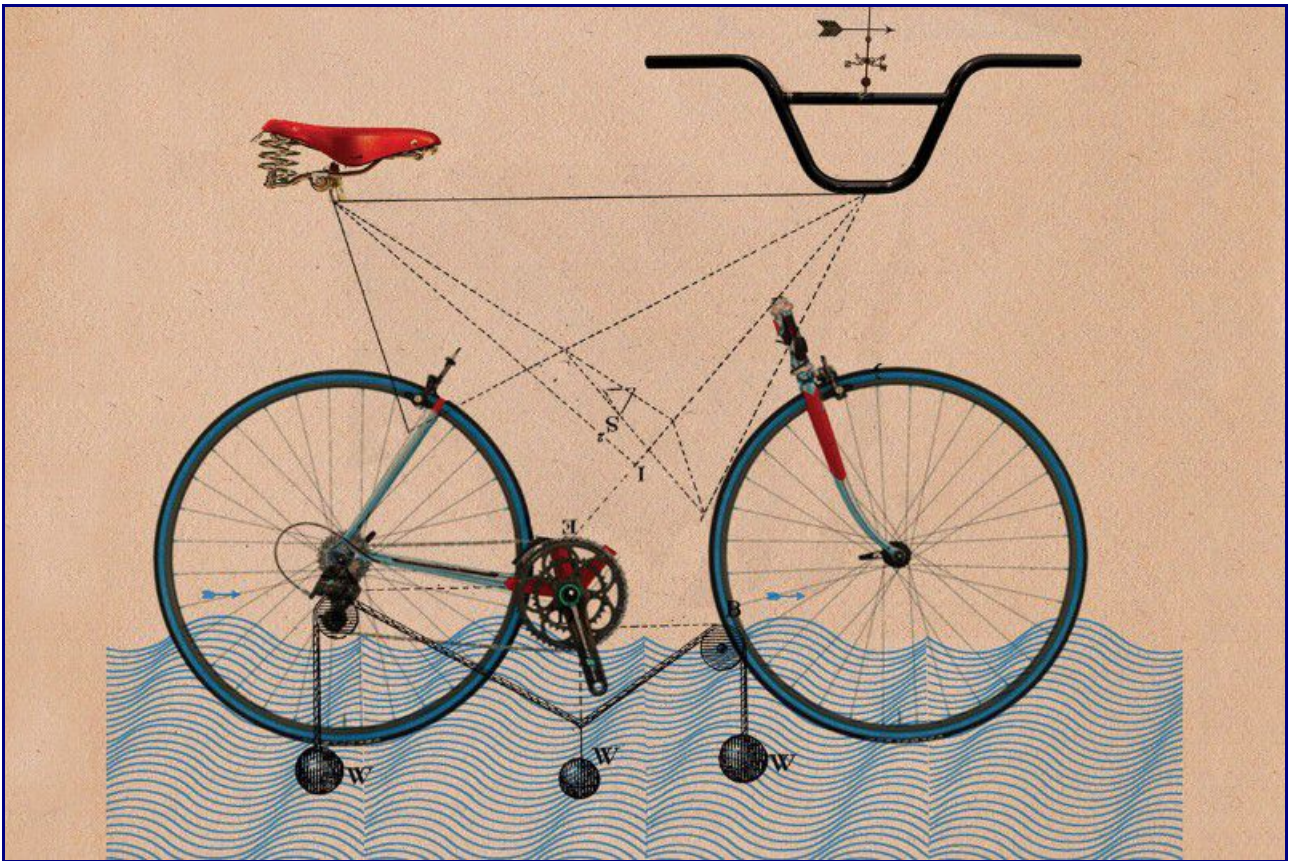
### What came before the big bang?

Has the universe existed forever? Or was there something before it? To find out, we need a working theory of quantum gravity and a new conception of time

## CYCLING

### How does a bicycle stay upright?

We thought we knew the maths behind cycling. We were wrong – and our efforts to figure it out are leading to some weird and wonderful new bike designs



# QUANTUM SCIENCE

## Where does quantum weirdness end?

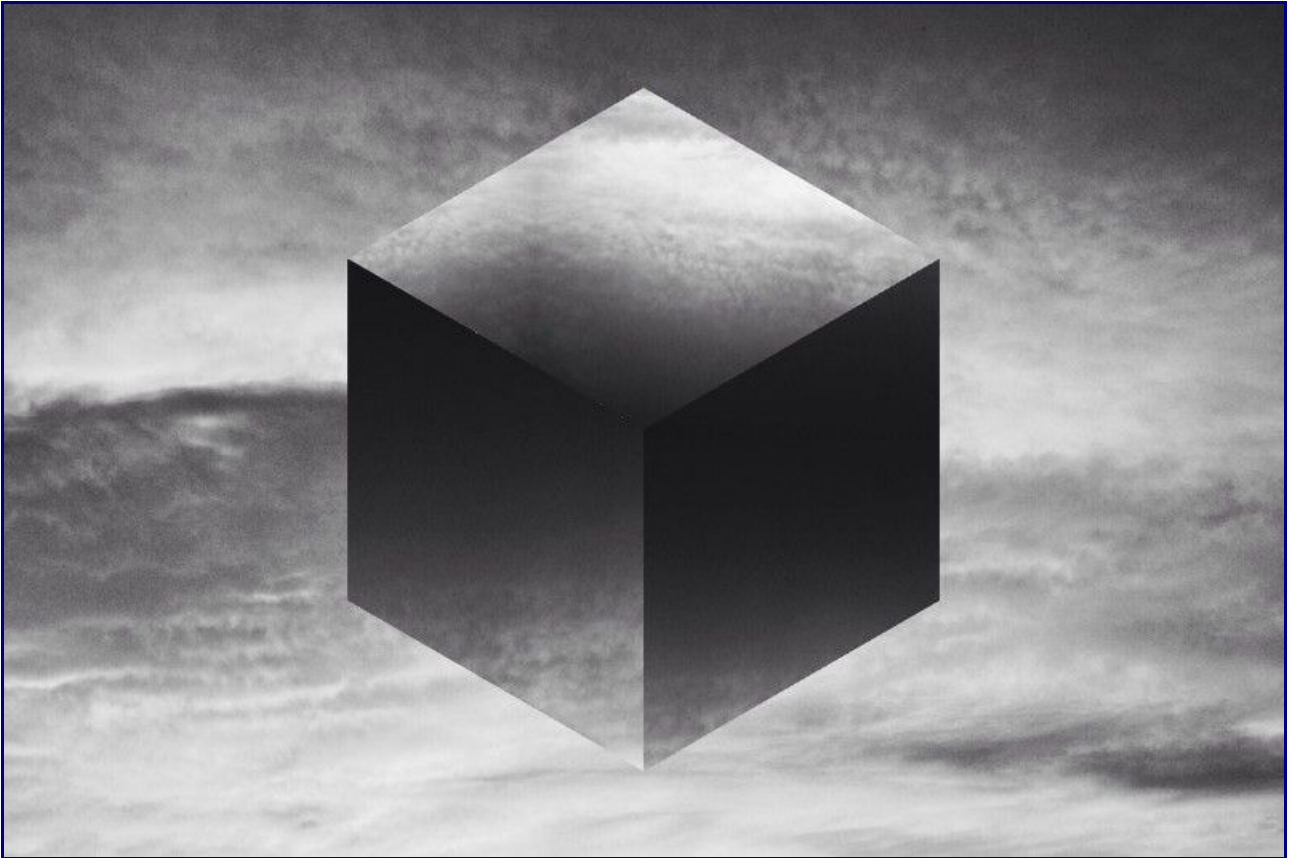
In the bizarre reality of the quantum world, particles can be in two places at once. Why can't golf balls or milk do the same?

# TIME AND SPACE

## Why do we move forwards in time?

Time goes by, or so it seems. It could be an illusion, or we might need to rescue the flow of time by meddling with our concept of space





## **MISSING DIMENSIONS**

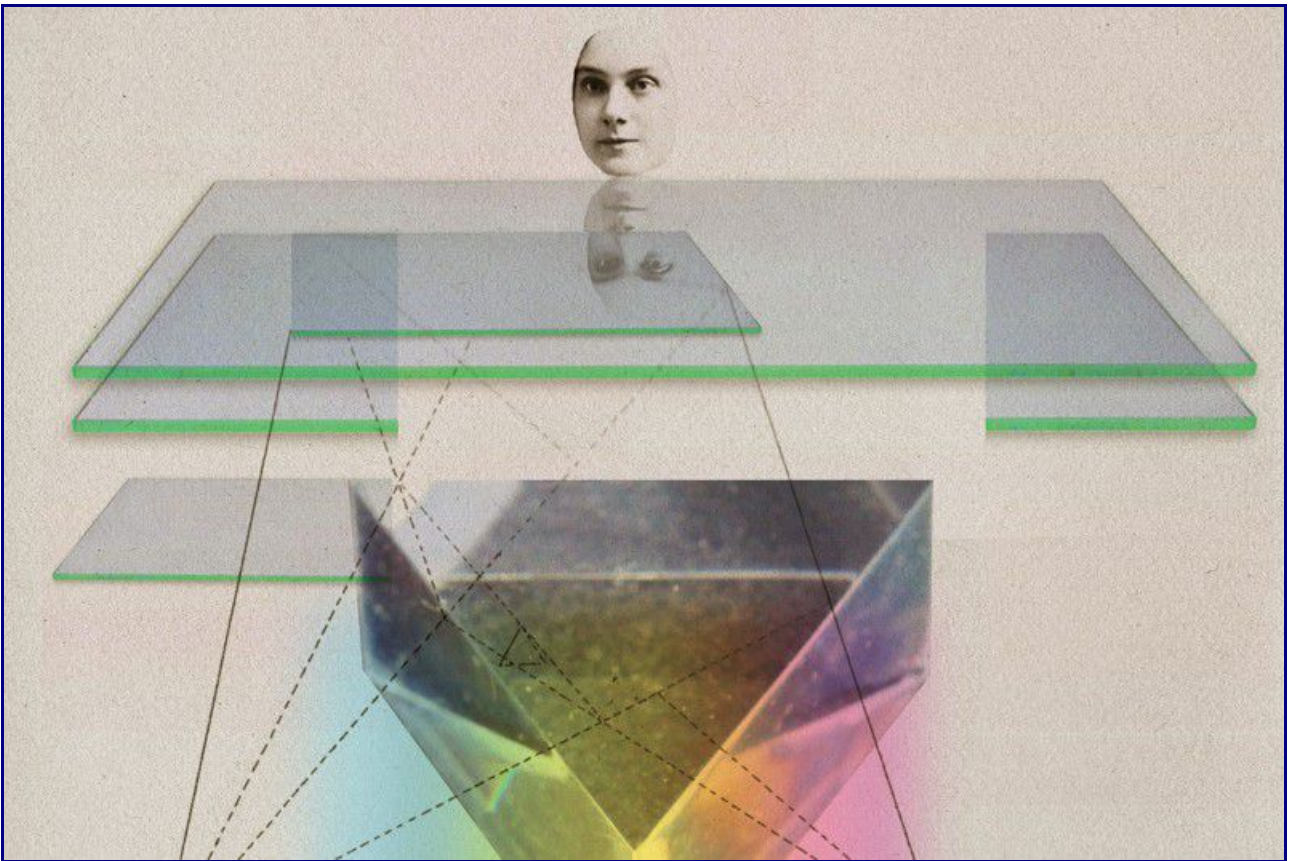
### **Why does space have three dimensions?**

The universe might go awry if not for the familiar three dimensions, but theories of everything say there should be more. What are we missing?

## **CASIMIR EFFECT**

### **Can we get energy from nothing?**

The Casimir effect suggests that the vacuum is fizzling with ephemeral particles. Is it real? And can we harness this energy concealed in empty space?



## LIQUID CHAOS

### What is glass?

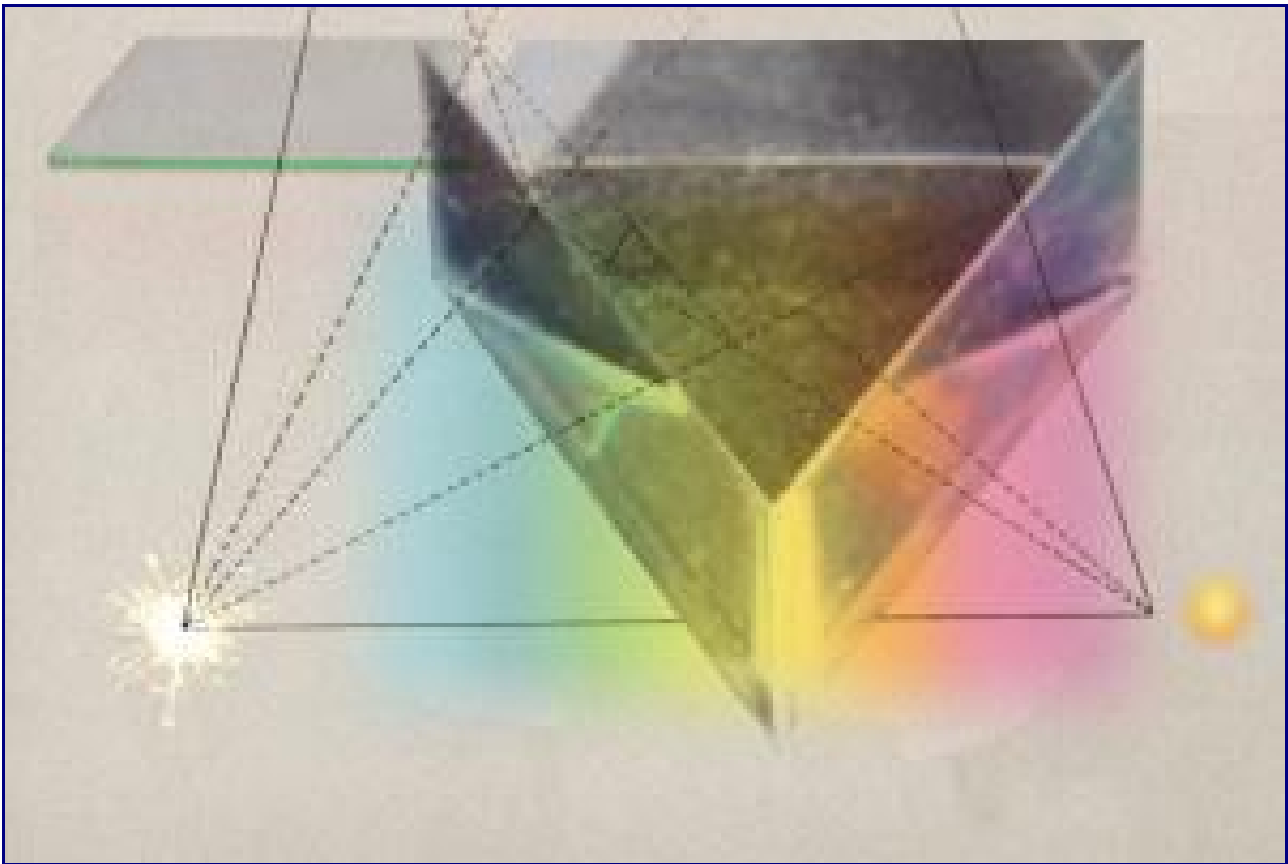
Things aren't as clear as you might think. Glass is a weird kind of solid liquid – and how it comes to be like that defies all explanation

## FIELD OF ICE

### Why is ice slippery?

Most think it's down to a liquid layer, but can't agree on how it forms. One theory insists it's a "supersolid skin" capable of electrostatic repulsion





## **PARTICLE PHYSICS**

### **How long does a proton live?**

They are the essential heart of every atom, so it's just as well we've never seen a proton fall apart. But they can't live forever – can they?

## **SOLAR SYSTEM**

### **Is the universe infinite or just very big?**

The size of the observable universe is easy enough to measure, but what lies beyond the cosmic horizon? We have a long way to go to find out

