



Using physics to solve the mystery behind the Malaysia Airlines Flight 370

For
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The Fated Downfall of MH370

On the night of March 8th, 2014, a Boeing 777 carrying 227 passengers and a further 12 crew members on board was flying from Kuala Lumpur to Beijing. As it left the airport, the last bit of communication from the plane to air traffic control was from the captain: *“Good night Malaysian three seven zero.”*

As it flew over the South China Sea, its radar turned off. At the time, no one knew why, or how it happened. It just did. MH370 went silent.

It never landed at Beijing, but no immediate debris was ever found from the plane, suggesting to those at the time that an accidental crash never happened, and it was likely purposeful, and someone (or something) else was behind its disappearance.

After its disappearance, the largest and most expensive underwater search was activated by multiple governments in the area, all hoping to try uncover some evidence behind what happened, but after months of searching, there was nothing.

This has left many to speculate about what really happened to the flight, with wild theories (some true, some slightly far-fetched) to explain what really happened to the plane.

**SEVERAL THEORIES OF THE DISAPPEARANCE HAVE BEEN PROPOSED
(BUT WHICH ONE IS MOST REALISTIC?)**



The Proposed Theories

Theory 1:

A fire in the cockpit of the plane or as it performs and emergency landing?

Theory 2: A Potential Hijack?



Theory 4:

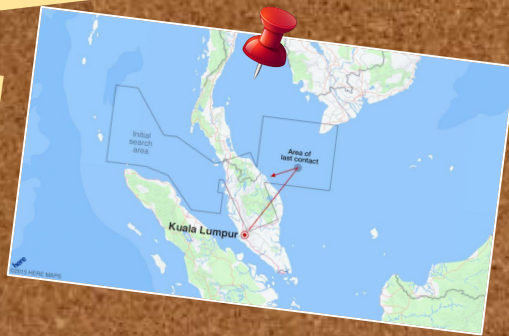
Black Hole or Wormhole which sucked in the plane and transported it elsewhere

Theory 3: Pilot Suicide



Theory 5:

Alien Abduction?



Theory 6:

The 'Shutdown' Hypothesis

Theory 8:

Killed by decompression

Theory 7:

Vertical entry into the sea

THEORY NO.1: FIRE

OVERVIEW

The first theory is that the pilot was attempting an emergency landing after something catastrophic occurred. A tyre could have caught fire during the landing, leading to the plane bursting into flames, leading to the destruction and the death of those on board.

Another suggestion is that a cockpit fire developed in the electrical wiring that spread rapidly, leading to a loss of flight instruments and control, therefore shutting off the radar.



The detrimental effects and electrical fire can cause to the cockpit of a plane.



A plane's wheel on fire as a result of friction causing and increase in its temperature.

EXPLANATION

A fire could have happened as when the plane lands, and the pilot applies the brakes, this increases **friction** due to the rapid **acceleration** of the wheels and tyres as it hits the runway at high **velocity**. When the brakes are applied, **kinetic energy** is **transferred mechanically** to the **thermal energy store**, increasing the temperature and causing overheating, which could potentially cause a fire.

Alternatively, a fire may start due to a fault in the electrics in the cockpit. When **electricity** flows through an object, the object emits a certain level of **resistance**. If this resistance is high, as electricity surges through it, there is enough electricity and **energy** to generate heat. If the wiring connections are poor, the heat alone can start a fire, however they also tend to produce sparks. In the presence of flammable materials, this can cause a major fire. Without realising and not following the necessary protocols, this can lead to the continual flow of electricity fuelling it, and so the fire burns, causing issues within the **circuits**, leading to the shut down of key equipment, and a blazing fire, leading to the destruction of the plane and the deaths of those on board.

DEBUNK

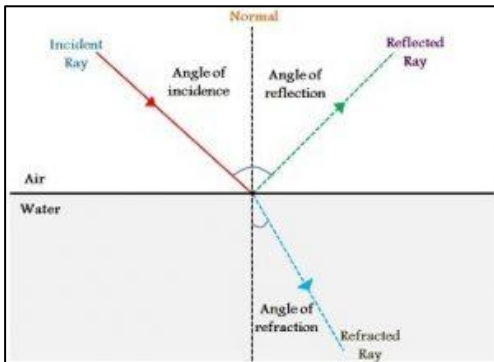
Although it is quite likely a fire could have happened, the fact that nobody on board noticed a rise in temperature in the cabin is unrealistic, as all crew members would know the necessary protocols to stop the fire and keep all those on board safe. Also, if it was indeed a fire, why was there no debris found? And why is it still such a huge mystery? Considering the plane is rumoured to continue flying after the radar was turned off, it also doesn't make sense as if there was a fire on board which 'turned off the radar', there would soon be no plane to fly around due to the flames. If this were to be true, it would have to be working with another theory to make sense.

THEORY NO.2: HIJACK

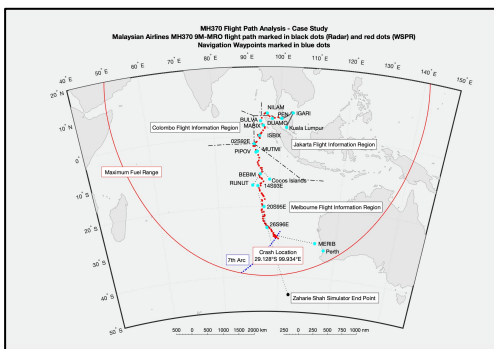
OVERVIEW

The possibility of a simple hijacking is quite likely. Researchers have identified 600 airports which the plane was capable of landing at, so the lack of landing, as well as multiple dramatic U-turns in the wrong direction don't make sense - unless it was hijacked, which would make sense for the radar to be switched off.

However, it was also confirmed that the plane had anti-hijacker doors, so how is it possible for the hijacker to get inside? Unless, the hijacker WAS the pilot...



A diagram demonstrating the process of reflection and refraction of EM waves.



An image of the WSPR findings

EXPLANATION

Radars use **electromagnetic waves** to detect the location of objects, like aeroplanes. A device called a **magnetron** generates high power **radio waves** (which are suitable for communications and broadcasting as their long **wavelengths** reflect of the **ionosphere**). An **antenna** can use these waves into a narrow beam and constantly directs them into the sky, until they hit an object (e.g. the aeroplane). The waves bounce off the aeroplane and travel back into the Earth. Some of the returned waves are detected by the antenna, and the data is processed by computers. Based on the speed and time of the radio waves, the computer works out distance of the aeroplane [$s=vxt$], confirming its location. The aeroplane is then displayed on the air traffic controller's screen.

Help signals could be intercepted by either **reflection** or **refraction** (as radio waves are EM waves, which all share these properties). This means it could be possible for the wave to be reflected and then travel in the opposite direction to where it aimed to reach, leading to it never being received. Alternatively, by refracting it, we can change the speed of the wave, hence changing the **frequency**, so the receiver is unable to detect the frequency at which it was initially sent.

DEBUNK

The chance of a hijack is very likely, especially if the pilot was indeed the hijacker- he would know how to work the radar and how to stop SOS signals from reaching air traffic control. As well, this would support the **WSPR** reports, where the disruptions showed MH370 performing sharp U-turns, something which a skilled pilot would have to perform and not the autopilot. The theory of the pilot being the hijacker is much more likely that an external hijacker's being able to enter and take over the plane, and this would open a number of theories which now also have the opportunity to be true.

THEORY NO.3: PILOT SUICIDE

OVERVIEW

Shortly after the flight's disappearance, media reports revealed that Captain Zaharie Ahmad Shah's wife and children moved out the house the day prior to the flight. It was also discovered that the pilot was having an affair with another woman and his relationship with her was also trouble. A fellow pilot also stated Shah seemed 'terribly upset'. Furthermore, the doors to the cockpit were anti-hijacker fortified doors, which prevents crew members and passengers from getting inside, therefore being unable to stop the suicide.

However, this is debatable because the captain of this flight was Muslim, and it is against Islam to commit suicide, but if he cheated on his wife, could we also question his commitment to his faith?



An image of the hijack proof doors which are present in all planes, and MH370.

EXPLANATION

The doors on the plane were hijack-proof. This means that the door to the cockpit was bulletproof and required a code for those to enter. Furthermore, it was impossible to enter from the outside if it is locked due to these factors. Typically, the outer layers are strongest, made of steel or other strong metals, whereas in between these layers are more layers of ballistic cloth, for example Kevlar, which would stop the bullet from going through the door. This material has the ability to **absorb** and then further **disperse** the **energy** which was **transferred** and **stored** from the bullet, decreasing the **total** (kinetic) **energy output** of the bullet in one specific area, leading to the door remaining intact. As well as this, the thick door meant that for the same change in **momentum** [$P=mv$], the thick layers of material would increase the total time taken for that change in momentum to occur, leading to a lower total **force** on the door [$F=(vP-uP)/T$], so it suffers less damage in the process and the door cannot be broken down.

DEBUNK

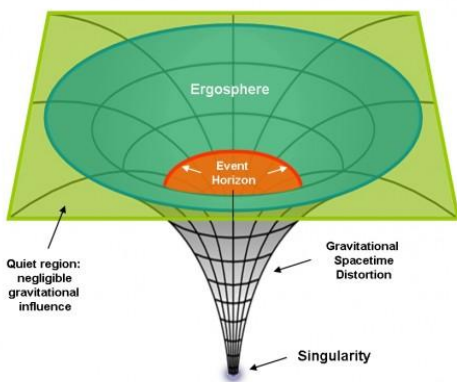
This can easily be debunked- all of the flight attendants had a special code to enter the cockpit in case of emergency, so if something had happened to the pilot, the cabin crew would be able to enter the cockpit and help the pilot and further call for help. However, there is a chance that this code was changed, and if passengers and crew were still alive at this point, they were not able to enter the cockpit, and there was nobody who could stop the pilot from doing whatever he wanted. Furthermore, the fact that no help would have been called on for the plane is reinforced by other theories (for example the hijack or the vertical crash, as discussed on page 5 and page 10). The chance of a pilot suicide is high, due to the incentives and mindset of the pilot already as he entered the flight, what remains is how?

THEORY NO.4: THE WORMHOLE

OVERVIEW

One of the most popular theories (even if not feasible) is how there were trained pilot on board who were able to purposely manoeuvre the plane as it was crossing the ocean into a small black hole, causing its strange disappearance.

Black Hole Regions



A diagram of the different regions of a black hole, demonstrating the pull of gravity in the black hole.

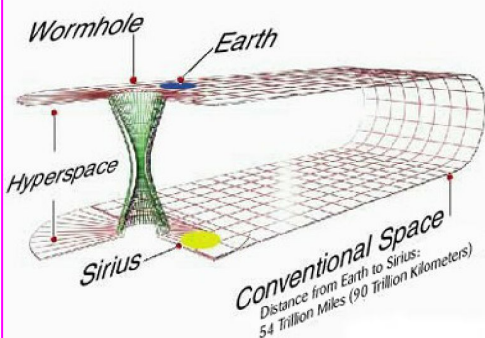
EXPLANATION

Black holes are regions in **space** which consist of a high level of **mass** packed into a tiny **volume**. This creates a **gravitational pull** so strong that not even **light** can escape. When **matter** falls into a black hole, it can never leave. Matter gets crushed into **subatomic components** and will eventually be squeezed into singularity. As the singularity accumulates more and more matter, the size of the black hole increases. If a black hole formed on earth, the planet would be consumed by its own **gravity**, causing everything to be crushed infinitely into a small point.

Wormholes are like a tunnel between 2 distant points in our universe, which (theoretically) can cut travel time from **light years** to minutes. Because they represent shortcuts in **space-time**, which means that they can also work as time machines, however they have never been found. Evidence for wormholes are found in the solutions to the equations behind **Einstein's theory of relativity** which include wormholes. This describes how **stars, planets** and objects move throughout space, and because the theory has been tested many times, we can conclude that wormholes must exist somewhere. However because they are so unstable, it would collapse under its own gravity, so would need **negative energy** to oppose gravity and stabilise the wormhole. However these energies would only be in small quantities and wouldn't be able to counteract the pull of gravity.

DEBUNK

Unfortunately there is no possible way this theory is correct, as even the smallest wormhole found on Earth would be spotted by **astrophysicists** all over the globe, and any secrecy of this would be hard to contain as it would be one of the greatest scientific discoveries of the 21st century. Furthermore, if the black hole was real, we would have all died due to the pull of gravity not only pulling in MH370, but also the whole planet, and due to the strength of its pull, it would almost certainly mark the end of our **solar system**.

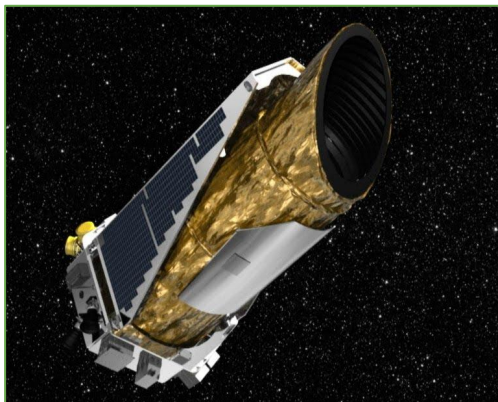


A diagram of how a wormhole works and how it can create a shortcut in space time. This could be something which has happened to the flight, transporting it somewhere far away.

THEORY NO.5: ALIEN ABDUCTION

OVERVIEW

Although very unlikely, it is rumoured that there was leaked footage of the plane, and as it approached a cloud before its disappearance, and an orb could be seen flying in the corner of the video. It is then joined by two more orbs and they begin to circle around the plane. A flash happens and then the plane (and the orbs) disappeared...



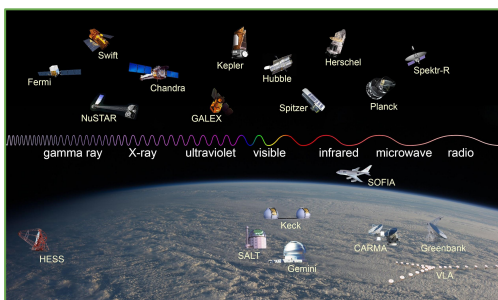
An image of the Kepla telescope

EXPLANATION

Although there has never been any evidence for extraterrestrial life, the **Fermi Paradox** aims to answer the question of where aliens are, explaining how aliens may have already been to Earth years before humans were even on the planet. Because the **universe** is so old (approximately 13.8 billion years), and because of the **big bang** (which we have evidence for through **redshift** and **CMBR**), this means the universe has had time to expand, so even at **light speed**, aliens would still take millions upon billions of years to reach Earth, and would most probably be dead by the time they've reached Earth. As nothing can travel faster than light speed (due to it being a **physics constant**), there is no way this time could ever be decreased and the chances of aliens ever reaching us on Earth is slim to nothing. Furthermore, even with more powerful **telescopes** like Kepla (which uses **infra-red** to pass through sediment in space to reach further), we are still unable to find aliens. It is much more likely that the video here was edited and faked, using the magic of CGI. This theory is still very much in the realms of science-fiction.

DEBUNK

Aside from the video being confirmed to be a masterpiece of CGI, posted on social media for clout, the chances of it have been an alien which took out the plane is slim to none. Considering that even with some of the most powerful telescopes ever made being in use and we still haven't found life outside of our **solar system**, it is safe to say that it is very unlikely that it was an alien abduction. Even if it was an alien, we would have been able to detect its entry into military airspaces (where the plane initially disappeared: at that point it was in Malaysian airspace) using disruptions in **radio waves**. All in all, if the existence of life outside of our own solar system hasn't been found, there is no way that it was an alien which took the plane- the chances are too slim and currently outside of the realms of scientific possibility.



A visual representation of the EM spectrum and the telescopes which use that type of wave.



An image of an alien. Don't worry, this isn't a real photo but what many think an alien would look like.

THEORY NO.6: SHOOTDOWN HYPOTHESIS

OVERVIEW

There have been multiple instances of civilian planes being shot down as a result of warfare in the country it is flying over, so it is relatively believable that the flight could've been shot by US-Thai military exercises in the South China Sea. But is this too far from the scene?



One of the combat planes which are used by the US-Thai air force, which is capable of taking down larger civilian aircraft.

EXPLANATION

To look into how potentially the flight could've been shot down by military planes, we have to look at air combat related **aerodynamics**. Aircraft have 2 kinds of energy: **kinetic energy** (speed) and **gravitational potential energy** (altitude). High levels of kinetic energy are needed to complete combat manoeuvres. In order to ensure you sustain enough kinetic energy for this, you must have enough gravitational potential energy in order to regulate it. By having a low kinetic energy but a high gravitational potential energy, you can dive and do a wider variety of manoeuvres by transferring some of the gravitational potential energy into kinetic energy. Conversely, high kinetic energy but low gravitational potential energy means you can convert the kinetic energy into gravitational potential energy to be able to do more complex manoeuvres. It is a good idea to stay at around 35000ft in order to quickly be able to change your path by swapping the stores of the energy.

DEBUNK

Military planes often fly at over 50000ft, which is well over the 35000ft recommended. This means that it will have more gravitational potential energy than MH370 (which flew at 39000ft before its disappearance). From what we know, MH370 travelled at Mach 0.84, compared to a military plane at **Mach 1.6**. As the military plane has more kinetic energy and gravitational potential energy than MH370, the military plane has an overall advantage, due to it begin able to move faster and also do a much wider variety of manoeuvres due to being able to still drop and gain more speed, making it very likely that MH370 could have been shot down, with the plane then making a speedy getaway without every being noticed by the passengers and crew on board. However, this wouldn't account for the lack of debris found during the search, as if it was shot down, either the plane would make an emergency landing at the nearest possible airport or crash into the sea, leaving debris to be found during rescue missions.



The route which MH370 was supposed to take, as you can see, if it was taken down by US-Thai air forces in the South China Sea, there are a multitude of emergency landing options for the plane to take.

THEORY NO.7: VERTICAL CRASH INTO THE SEA

OVERVIEW

There is a theory that the plane had crashed into the ocean at a 90° angle, as a result, leaving no ruminants of the aircraft anywhere as it stayed intact as the plane plummeted into the sea.

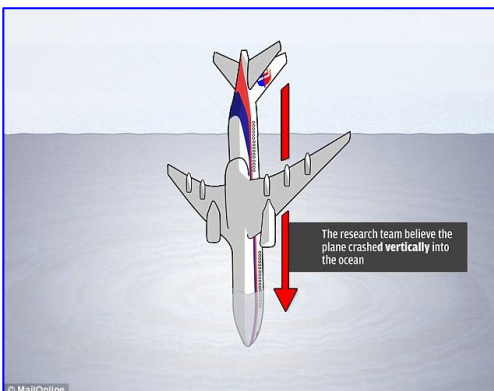
Mathematician Goong Chen led a research team in order to test the different methods in which the plane could have crashed into the ocean. By using simulations on a supercomputer, they were able to determine that the plane was able to nosedive into the sea without any debris from the wreckage. According to the research team, 'the forensics strongly supports that MH370 plunged into a nosedive'.

EXPLANATION

The theory itself is very feasible and what happens is similar to a high diver diving into a swimming pool. Due to the good **aerodynamics** of the nose of the plane, this means that there would be little **water resistance** as the plane nose-dived into the sea, so there would be little force as the plane hit the water. The rounded nose of the plane as well as the smooth gradient towards the top of the fuselage would mean more water would be able to pass over the plane smoothly, much alike to how this would function in the air to reduce **drag**, hence lowering the **impact force**. The effect of air (or in this case, water) flowing over the plane is called the **coanda effect**. Furthermore, due to the perfectly vertical angle at which the plane would be run into the water, this would mean that it would break the water at an overall smaller surface area, and would be much alike to an arrow slicing through the air, which further reduces the overall force at which the plane breaks the water. With all of these factors combined, this means that there would be little to no damage done to the plane as it plunged into the ocean at high speeds and power, and so it would remain completely intact as it sunk to the bottom of the ocean, leading to the lack of debris being found during the search for the plane.

DEBUNK

Although this is one of the more likely theories, there is no way that the plane could have fell nose first into the sea without a pilot controlling it. This is due to the **lift** provided by the wings of the plane, which are designed to allow the plane (even if it loses all fuel) to glide to the next available landing spot. Because of this, for a vertical crash to happen, there would have had to been a pilot aiming the plane into the sea at the 90° angle. This means that the plane would have to have a skilled pilot to drive the plane into the sea, as there is no way this could have happened without.



A diagram of how MH370 could have crashed into the sea at the 90° angle. This is a lot like cliff diving, so it would most definitely be quite a likely theory.

THEORY NO.8: KILLED BY DECOMPRESSION

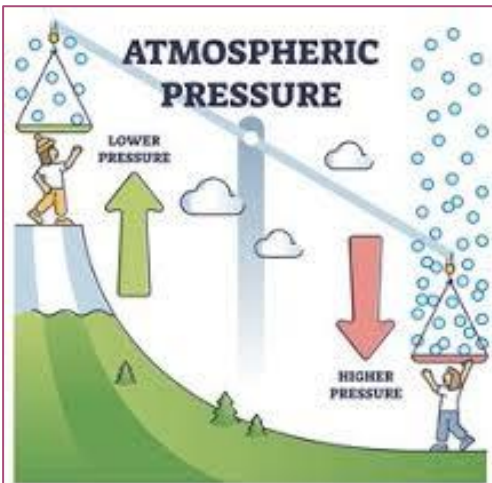
OVERVIEW

As the plane got to its cruising altitude, the theory goes that someone deliberately decompressed the plane, leading all the passengers to die due to hypoxia due to depressurisation. Although oxygen masks would be deployed, they would only last 12-15 minutes, so the chance of survival is low.

EXPLANATION

As altitude increases, air becomes much less **dense**, hence decreasing the **pressure**. This means that breathing will become more difficult as fewer oxygen molecules are taken into the body due to the thinner air. This is because most of the air's molecules are held close together by the force of **gravity**, and so by moving further away from the core of the Earth, this means that there is less **force** holding the air molecules together, causing the lower pressure.

Inside the plane will have a much higher pressure inside the cabin than outside the plane. This is mostly done in order to make the flight experience more comfortable for passengers and crew. However, you can **depressurise** the cabin by opening the outflow valve, which causes air to rapidly rush out of the plane from an area of high pressure (in the plane) to an area of low pressure (outside the plane), down the **pressure gradient**. This rapid lack of oxygen and rapid change in air pressure as it moves into **equilibrium** can lead to pressure related injuries and **hypoxia**, which, if left untreated, can be fatal. This could be what killed all the passengers on board the flight, leading them to never know what happened as the plane disappeared, hence no extra calls for help from passengers or cabin crew.



A representation of how atmospheric pressure is affected by altitude.

DEBUNK

This is definitely one of the more possible theories to explain why the passengers on board never called for help, or why the cabin crew never sent out emergency help signals. However, it would be hard to change the valve position as it is automated by the pressurised control system, as well as a number of safety features which stop the pressure from reaching dangerous levels even when the system fails. However there is a possibility that this system could be overridden, especially if the pilot was already prepared for this to happen. By doing this, the pilot would be able to neutralise the passengers, allowing him to do whatever he wanted to without anyone being able to stop him.



The outflow valve on the fuselage of a plane is similar to a water bottle with a little hole in its side. By varying the size of the hole, we can regulate the pressure inside the cabin of the plane.

THE ONGOING SEARCH: THE HUNT FOR THE BLACK BOX

WHAT IS THE 'BLACK BOX'?

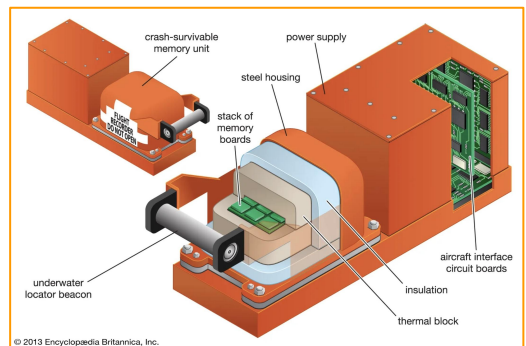
The black box is a data logger which is built into the plane. It is equipped with an underwater tracking **beacon** for it to be retrieved, a stack of memory cards for data collection and storage, and many other things as detailed on the diagram below. It is supposed to be able to survive any condition, even if the plane and its passengers do not. It is mandatory for every aircraft and is very durable to allow for the information to be received when needed by authorities. The only way we can find out what almost certainly happened to MH370 is by finding this black box (which contrary to popular belief is actually orange) and using the data to find out what really happened on that fateful night.



An example of a black box which would be inside the fuselage of MH370.



An example of a hydroscope which was used to try locate the black box.



A diagram of what is inside a black box which allows it to collect all flight data.

THE SEARCH

In order to find the box, Australian, Malaysian and Chinese governments conducted the largest and most expensive underwater searches ever undertaken, covering over 120,000 square kilometres to find it. To do this, they used a variety of equipment, all adapted to pick up **sonar** signals. These signals are **sound waves** which can be used to detect objects underwater. Active sonars are those which emit these waves and use their echos to determine the location of the object, and passive sonars listen for underwater sounds. Using a **hydrophone**, they had picked up **pings** from the ocean which matched the **frequency** of those consistent with those emitted by aircraft black boxes. After a pinger signal was located, they used a **sidescan sonar** to try determine the location of the box. The hydrophone transmits pulsed signals from each side of the vehicle which are then **reflected** by the seabed or objects back to the hydrophone. Hard materials will produce more **scatter** whereas softer materials will **absorb** more sound. Different amount of scattering produces different amount of **acoustic** return, and so images can be created as a result of this scattering. Unfortunately, even by using this method, the black box has still been yet to be found, and most likely will never be, as many governments had abandoned the search after they all searched their designated zones and had found nothing.

A Conclusion?

Most of these theories are feasible - but a lot of them rely on each other to be true, which only adds to the overall mystery of the case. Although many say that we will never be able to find the truth of this mystery, and it will be left to speculation for the rest of eternity, many have firm beliefs that when the search for the black box finally becomes successful, it will allow us to discover what truly happened to the plane [see page 12].

Obviously there are many more explainable theories (e.g. a hijack or a crash) which are much more likely to be what happened. These are the theories which are more likely to be true, due to how they are all able to explain all the variables which are at play in the case.

However, as people speculate, it opens the doors to new and more creative theories, those which stretch the boundaries of physics to explain all the reasons why the plane disappeared with no trace. However, to some extent, all these far-fetched theories all somehow still make sense.

But at least for the near future, the real reason behind the disappearance of MH370 will forever remain a mystery to us, unless...

...what if...

Theory Board

- Theory 1:
A fire in the cockpit of the plane or as it performs and emergency landing?
Hmm maybe...
- Theory 2:
A Potential Hijack?
*Maybe because of T3?
Or something else?*
- Theory 3:
Pilot Suicide
*Poor mental health?
Why?*
- Theory 4:
Black Hole or Wormhole which sucked in the plane and transported it elsewhere
~~No possible way~~
- Theory 5:
Alien Abduction?
~~nope~~
- Theory 6:
The 'Shootdown' Hypothesis
*Possible, most likely
no...*
- Theory 7:
Vertical entry into the sea
This makes so much sense...
- Theory 8:
Killed by decompression
*Malicious intent?
Stopped people talking...*

OUR FINAL, PHYSICALLY CORRECT THEORY

None of the theories we have discussed above are able to bring justice to the mystery of MH370. In order to combat this, we have come up with our own theory which aims to explain what really happened on the night of the 8th of March, 2014.

STAGE 1: THE HIJACK OF THE PLANE

Before the plane even leaves the airport, something has gone wrong. The plane's pilot is not in a state fit for flying, and he hijacks his own plane. He has plans to crash the plane in flight, in a mass murder suicide attempt, and this plane is the perfect opportunity for this. With hijack proof doors [see page 6], nobody could enter the cockpit and stop him, except the flight attendants and passengers, who had the power to call for emergency help at any time, as well as his co-pilot. In order to stop this, the captain would have to neutralise anybody who would be a threat to his plan. Maybe he was in a poor mental state, or had pure malicious intent, but something had caused him to put this plan into action, as an act of mass murder-suicide.

STAGE 2: CABIN DEPRESSURISATION

The plane takes off, and as the plane climbs, the pressurised control system allows for the cabin to be at a comfortable 10.9 **psi**. As the plane gets to its cruising **altitude** of 39000 ft and halfway across the South China Sea, this gives the pilot the perfect opportunity to neutralise any threats to his plan and **depressurise** the cabin. By opening the outflow valve, air rushes out of the cabin down the **pressure gradient**, causing many to suffer from pressure related injuries and **hypoxia**, leading to their deaths. Oxygen masks available to passengers can only sustain them around 15-20 minutes [see page 11]. In comparison, the pilot remains conscious as the oxygen of the cockpit can last 8 times the duration (2 hours) of those available to the passengers, giving him time to switch off the **radar** and go silent, as he decides what to do next, without the pressure of a potential stop to his plan.

STAGE 3: U-TURNS IN THE SKY

Whilst in the air, the pilot seems to perform a number of strange manoeuvres which are difficult to explain why he did so. Maybe he was nervous, or maybe he was trying to find the ideal place away from military watch to perform the act. By looking at the **WSPR** data (which shows us slight disruptions to the waves as MH370 goes past [see page 5]), the data shows how and where the plane performs a number of sharp U-turns in the air, something which the autopilot could not perform and would have to take a skilled pilot to perform due to the high levels of concentration it takes from a pilot to perform. After a number of sharp U-turns, the pilot moves it out of military **radio wave** receivers. The plane is untraceable by anyone, and the captain can do whatever he wants to his plane.

STAGE 4: A VERTICAL CRASH INTO THE SEA

As the cockpit begins to run out of its vital oxygen supplies, the captain can no longer stall from his final decisions. Carefully, he manoeuvres the plane back over the ocean. By meticulously moving the yoke, he points the nose of the plane towards the ocean, until it is **perpendicular** to the waves. This is physically challenging, as the plane was not built for nose-dives, but he continues, determined to finish the job. After all, wouldn't he be in more trouble if he turned back and turned himself in?

As it builds **velocity**, the plane **accelerates** towards the ocean, seamlessly plunging into the ocean with a relatively small splash. Due to the ideal **aerodynamics** of plane, it allows for the plane to fall into the ocean, which reduces the overall **force** it lands into the ocean with. This preserves the plane's condition, and keeps it intact, hence no debris was found immediately after the incident [see page 10]. The captain and any survivors die as a result of drowning and lack of oxygen, and the body of the plane is lost at sea forever.

STAGE 5: THE RESCUE

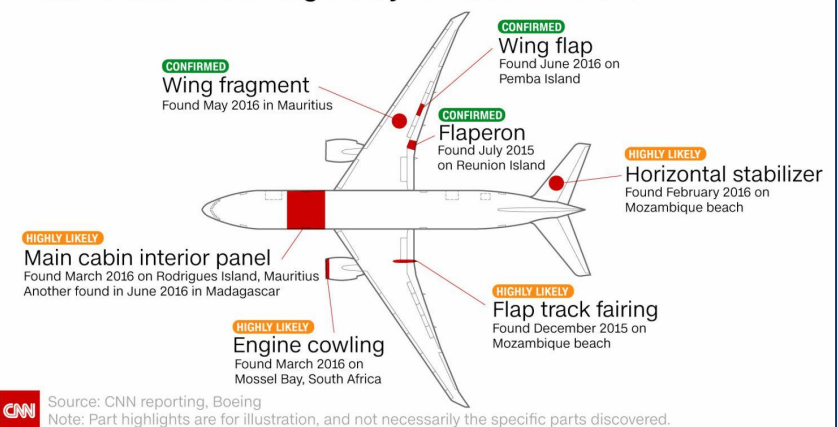
Due to the way in which the plane plunged into the sea, almost no debris was found immediately after the crash. A search and rescue mission was almost immediately conducted to find the body of the plane and find out what really happened to it, however after months of searching using the most high-tech equipment available at the time, they found nothing [see page 12].

Over a year later in 2015, a piece of the flaperon on the wing of the plane was found on Réunion Island in the Indian Ocean, confirmed to be from MH370. After this, many more parts of the plane were found. This makes sense: after the plane landed into the sea, the aircraft was preserved during the immediate search, due to the aerodynamics of the plane. However, as the plane marinated at the bottom of the ocean, the strong ocean currents of the Indian Ocean broke off the delicate parts of the plane (e.g. the flaperon), and then it drifted off to be found.



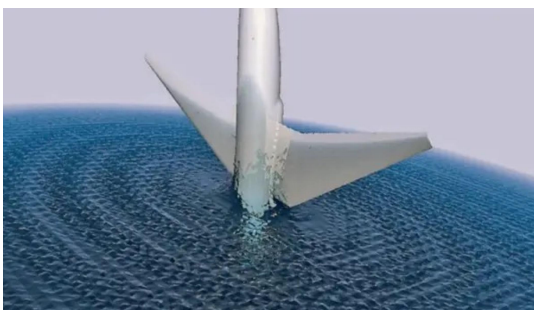
A map of the route in which MH370 took

Debris found of missing Malaysia Airlines MH370



A diagram of which bits of MH370 were found, with 3 being confirmed, and a further 4 being said to be highly likely that it came from the plane. These could have all been ripped apart by the currents of the Indian Ocean after it plunged into the ocean.

A visual representation of how the flight crashed into the sea. This is what we (and many others) think is what happened to the plane, hence the lack of debris.



CLOSING THOUGHTS

As people who love a mystery, and people also love physics even more, we have tried to use as many scraps of information and judging our research to find out what really happened, and we hope this brings justice to the mystery which is the disappearance of Malaysian Airlines 370.

Using the information provided and researched, our theory which we have compiled as a result of all our research still fails to answer many questions which come with the mystery, as well as developing many of its own, such as if the plane was able to land so seamlessly, why was debris even found in the first place? Or even why debris wasn't found earlier? And why there were still no SOS calls, even from the second pilot?

We have almost certainly missed aspects of the mystery and they search for the plane which may have been beneficial to finding out what happened to the plane, however this is more likely due to the lack of thorough research rather than the lack of information available (it's safe to say any information which is unable to be found is not due to the government hiding it, but we aren't just looking hard enough, contrary to the belief of many conspiracist around the world). Furthermore, upon reflection of the theories and discussing with engineers and other physics and flight enthusiasts, there are still so many theories which people are constantly coming up with which may in itself be the reason for its disappearance.

Even though in the past 10 years, there has been many more pieces of debris and many more findings being discovered, and this has contributed to theorists all over the world to piecing together all the scraps information to find out what truly happened to the fated flight.

There is still so much more to be discovered about what happened, and also what happened to the black box, the one object which will hold the key to finding out what really happened that night.

However, even as more information has been revealed about what happened, and as people find out more creative ways to use physics to try solve the mystery, what really happened that night is still a mystery, and is likely to remain a mystery for the foreseeable future.

Maps and data can only take us so far- to really uncover what happened and find absolute clarity in what happened is to develop new technologies using physics and engineering to help us find the remaining pieces of evidence, and finally put all the theories away for good, as the truth bobs back up the surface of the ocean and we discover what really happened to the flight Malaysian Airlines 370.

GLOSSARY OF TERMS

Absorption: To take in

Acceleration: The rate of change of velocity

Acoustic: Having to do with sound

Aerodynamics: The study of forces and the resulting motion of objects through the air

Altitude: The vertical evaluation of an object above a surface

Antenna: A (usually) metallic device which is used for radiation or receiving radio waves

Astrophysicists: A scientist who studies the physical and chemical structures of stars and planets etc.

Beacon: A radio transmitter emitting signals to guide others, e.g. aircraft.

Big Bang: The theory that the universe originated from a hot dense region and then expanded and cooled after a giant explosion, called the Big Bang.

Black Holes: A place in space where gravity pulls so much that even light can not get out

Circuits: A closed loop of electrical components through which electrical currents flow through

CMBR: The presence of cosmic microwave background radiation which is present all over the universe and began as gamma but was stretched during the expansion of the universe.

Coanda effect: The tendency of a jet of fluid emerging from an orifice to follow an adjacent flat or curved surface and to entrain fluid from the surroundings so that a region of lower pressure develops

Dense: How closely packed particles are in an object

Depressurisation: The process of becoming lower in air pressure

Disperse: Distribute or spread over a wide area

Drag: The force that opposes the relative motion between an object and a fluid

Einstein's Theory of Relativity: The basic theory that instead of attracting objects, gravity is curving or warping space

Electricity: The flow of charged particles

Electromagnetic waves: A family of transverse waves that move at the speed of light through a vacuum

Energy: A property that must be transferred to an object in order for it to work

Equilibrium: Objects or systems that are in equilibrium have no net force and no net torque acting on them

Fermi Paradox: The discrepancy between the lack of conclusive evidence and the high likelihood of the existence of aliens.

Force: A push or pull on an object. When forces are balanced, the object either remains in constant motion or stays stationary. When the forces are unbalanced, the object will either accelerate or decelerate

Frequency: The number of waves which pass a certain point per second.

Friction: A force in between two surfaces sliding across each other.

Gravitational Potential Energy: The energy an object has due to its position above Earth

Gravitational pull: An attractive force exerted by a massive body on the massive body like planets

Gravity: A force that pulls objects to the centre

Hydrophone: An underwater microphone that will listen to, or pick up, acoustic signals. It then converts acoustic energy into electrical energy

Hypoxia: Low levels of oxygen in the bodily tissues, which can cause many problems in the body

Impact Force: A force that delivers a shock or high impact in a relatively short period of time

Infra-Red: This is a part of the electromagnetic wave spectrum. It has a longer wavelength than visible light but a shorter wavelength than microwave.

Ionosphere: The part of the earth's atmosphere in which ionization of atmospheric gases affects the propagation of radio waves

Kinetic energy: The energy of motion e.g. a car moving

Lift: A mechanical aerodynamic force produced by the motion of an object through the air, causing it to 'lift' up

Light: An electromagnetic wave. It is the only part of the spectrum which we can see.

Lightspeed: 3×10^8 m/s. It is the speed at which light travels.

Light Years: The distance travelled by light in a vacuum, measuring by how long it takes to get from one place to another. It is used for very long distances.

Mach: A measure of speed

Magnetron: A vacuum tube in which the flow of electrons is controlled by an applied magnetic field to generate power at microwave frequencies.

Mass: The amount of matter an object contains.

Matter: Anything that has mass.

Mechanical Transfer: A type of energy transfer, typically involving moving parts.

Momentum: A quantity relating to a moving object [$P=mv$]

Negative energy: An energy that is present in any particle with a negative value.

Perpendicular: Forming a right angle when they meet.

Physics constant: A set of fundamental invariant quantities which are mainly observed in nature and generally physical science.

Pings: An audible sound wave sent to find an object.

Planets: A celestial body which is in an orbit around a star, has sufficient mass for its self-gravity to overcome rigid body forces as that it assumes a hydrostatic equilibrium shape, and has cleared the neighbourhood around its orbit.

Pressure: The physical force exerted on an object.

Pressure gradient: A way to describe the difference in atmospheric pressure from one location to another.

Psi: The pressure that results when a pound of force is applied to a unit area of 1 square inch.

Radar: A device that sends out radio waves for locating an object by the reflection of them.

Radio Waves: One of the electromagnetic wave. It has the longest wavelength.

Redshift: When the wavelength of light is stretched towards the red end of the spectrum due to the expansion of the universe.

Reflection: The return of waves from a surface.

Refraction: The bending of light or sound as it speeds up or slows down as it passes through a more dense or less dense object.

Scatter: Throw in various different directions.

Sidescan Sonar: A category of sonar system.

Solar System: A star and the group of planets and other bodies which orbit around it.

Sonar: A method or device used for locating objects especially underwater by means of sound waves sent out to be reflected by the objects.

Sound waves: A type of longitudinal wave which is created by vibrations in molecules, which is heard as sound

Space: A colloquial term for the universe.

Space-time: A mathematical model that fuses the three dimensions of space and the one dimension of time into a single four-dimensional continuum.

Stars: Any massive self-luminous celestial body of gas that shines by radiation derived from its internal energy stores.

Stores: In terms of energy, they are associated with the movement of objects and position of objects in a field, describing how energy is used.

Subatomic components: The particles which make up an atom: protons, neutrons and electrons.

Telescopes: Instruments which are used for viewing distant objects, usually objects in outer space.

Thermal energy store: When energy is stored as heat.

Total energy output: The sum of useful energy output and useful energy output.

Transferred: The movement of energy from store to store.

Universe: A large collection of billions of galaxies.

Velocity: The speed of something in a given direction, usually measured in m/s.

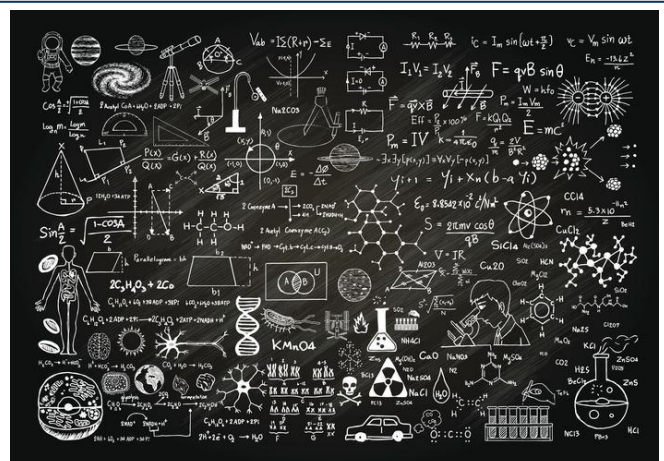
Volume: The amount of space a 3D shape takes up.

Water Resistance: A type of force that uses friction to slow things down that are moving in water.

Wavelength: The distance between two successive points of a wave, measured in the direction that a wave travels, usually measured in metres.

Wormhole: In theory, it is a tunnel between two distant points in our universe that cuts the travel time from one point to the other.

WSPR: Weak Signal Propagation Recorder- it is a protocol implemented in a computer program which is used for weak signal communication between amateur radio operators. This database can be accessed by anyone.



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Any sources which have been missed have been accidental and anything which has been found to be missed can be added into the reference list in due course.

