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Physics in the news

What sank the *Titanic*?

Mike Follows

Just over a century ago, the RMS (Royal Mail Steamer) *Titanic* sank on its maiden voyage, an event that shocked a public that had been led to believe that it was 'unsinkable'.

At 11.40 p.m. on Sunday 14 April 1912, bound for New York from Southampton, *Titanic* struck an iceberg and sank within 3 hours, taking two-thirds of her 2224 passengers and crew to a watery grave just off the Grand Banks of Newfoundland.

Titanic has attracted its share of conspiracy theories. These include the downright bizarre — like the curse of Amen-Ra:

<http://www.titanicandco.com/curse.html>

as well as the more plausible, such as the theory outlined by Robin Gardiner in his book, *Titanic: The Ship That Never Sank?*:

<http://www.youtube.com/watch?v=WdxJp2fVXJ8>

However, as we shall see, some simple physics may have doomed the *Titanic* to an icy grave 4 kilometres down in the North Atlantic.

Did the Moon sink the *Titanic*?

A recent article in *Sky & Telescope* magazine discusses the coincidence of three astronomical events in early January 1912 that may have increased the number of icebergs crossing the path of *Titanic* 3 months later. You can read the article at:

<http://www.skyandtelescope.com/community/skyblog/newsblog/147339175.html?pageSize=0>

The events are summarised in this table:

Astronomical event	Date and time
Spring tide (full Moon)	4 January 1912, 13h 29m UT
Earth at perihelion	3 January 1912, 10h 44m UT
Lunar perigee	4 January 1912, 13h 35m UT

The Sun and Moon were lined up on opposite sides of the Earth, creating a spring tide. This occurs twice a month so is not unusual, but the orbits of the Moon around the Earth and of the Earth around the Sun are both eccentric (i.e. not quite circular). On 3 January, the Earth was at its closest point to the Sun (perihelion) in its annual orbit and, the following day, the Moon was at its closest point to the Earth (perigee) in 1400 years. This increased the gravitational pull of the Moon and Sun, leading to a significant increase in the height of the tides. This may well have re-floated icebergs, which regularly

become grounded in the shallow waters off Newfoundland on their southwards journey. The increased population of icebergs made a collision with *Titanic* more likely.

Did the *Titanic* sink because of an optical illusion?

On the night *Titanic* sank, the SS (steamship) *Californian* had stopped to avoid the risk of colliding with ice. Compelling research by British historian Tim Maltin suggests that an optical phenomenon called super refraction might explain why the SS *Californian* failed to come to the *Titanic*'s aid, despite being the closest ship, and why efforts by both crews to communicate by Morse lamp met with no response: because neither crew could see each other's signal. Lord, the *Californian*'s captain, said he repeatedly had someone signal the *Titanic* by Morse lamp but 'she did not take the slightest notice of it'. Super refraction may also have made it impossible for *Titanic*'s lookouts to see the iceberg in time:

<http://www.smithsonianmag.com/science-nature/Did-the-Titanic-Sink-Because-of-an-Optical-Illusion.html>

Titanic was sailing from the warm waters of the Gulf Stream into the cold Labrador Current, ideal conditions for super refraction.

We know that super refraction creates the so-called Fata Morgana mirages seen at sea:

[http://en.wikipedia.org/wiki/Fata_Morgana_\(mirage\)](http://en.wikipedia.org/wiki/Fata_Morgana_(mirage))

Such images may well provide the scientific explanation for the *Flying Dutchman*, a mythical ship doomed to sail the oceans forever. Mirages caused by super refraction, known as hillingar in Icelandic, are common in Arctic regions and were first observed and documented in 1596 by Willem Barents while searching for the Northeast Passage. His ship became stuck in ice at Novaya Zemlya, where the crew was forced to endure the polar winter. Their midwinter night came to a premature end with the rise of a distorted Sun about a fortnight earlier than expected — light carried to them by super refraction. It was not until the twentieth century that science could explain the experience of Barents' observation but the same science might account for *Titanic*'s failure to spot the iceberg in time and the inaction of the SS *Californian*.