The Physics Of Interstellar

By Hannah Wakeling

Murphy's Law

- "Whatever can happen, does happen."
- Unsure of where Murphy’s Law originates;
- Possibly first coined due to mathematician Augustus De Morgan in 1866.
- Referenced to by Alfred Holt at an 1877 engineer’s meeting.

Gravity

Gravity in the film.

- Principle concept.

- Distortions in spacetime.

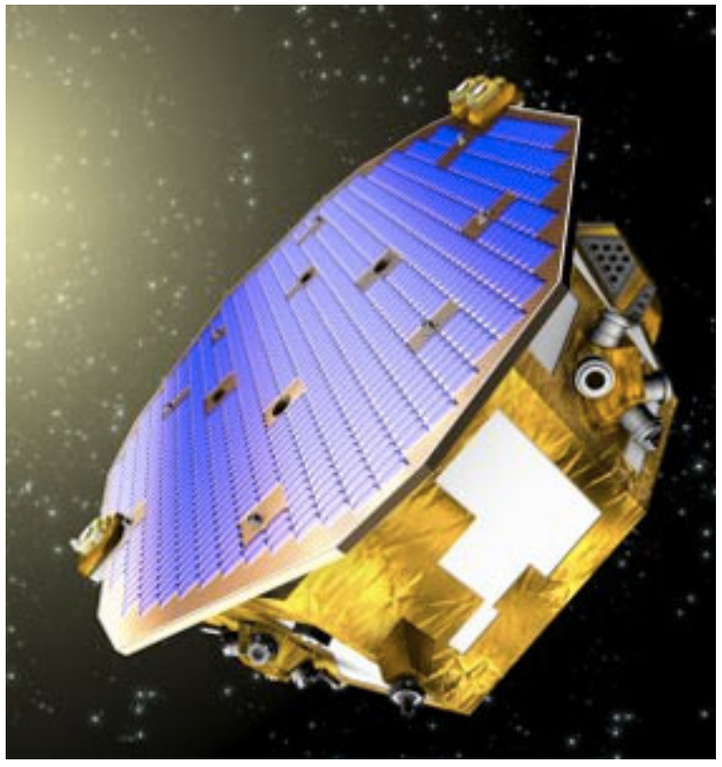
- Gravity transcends all dimensions, including time. Messages can be sent.

- Artificial gravity.

Gravity

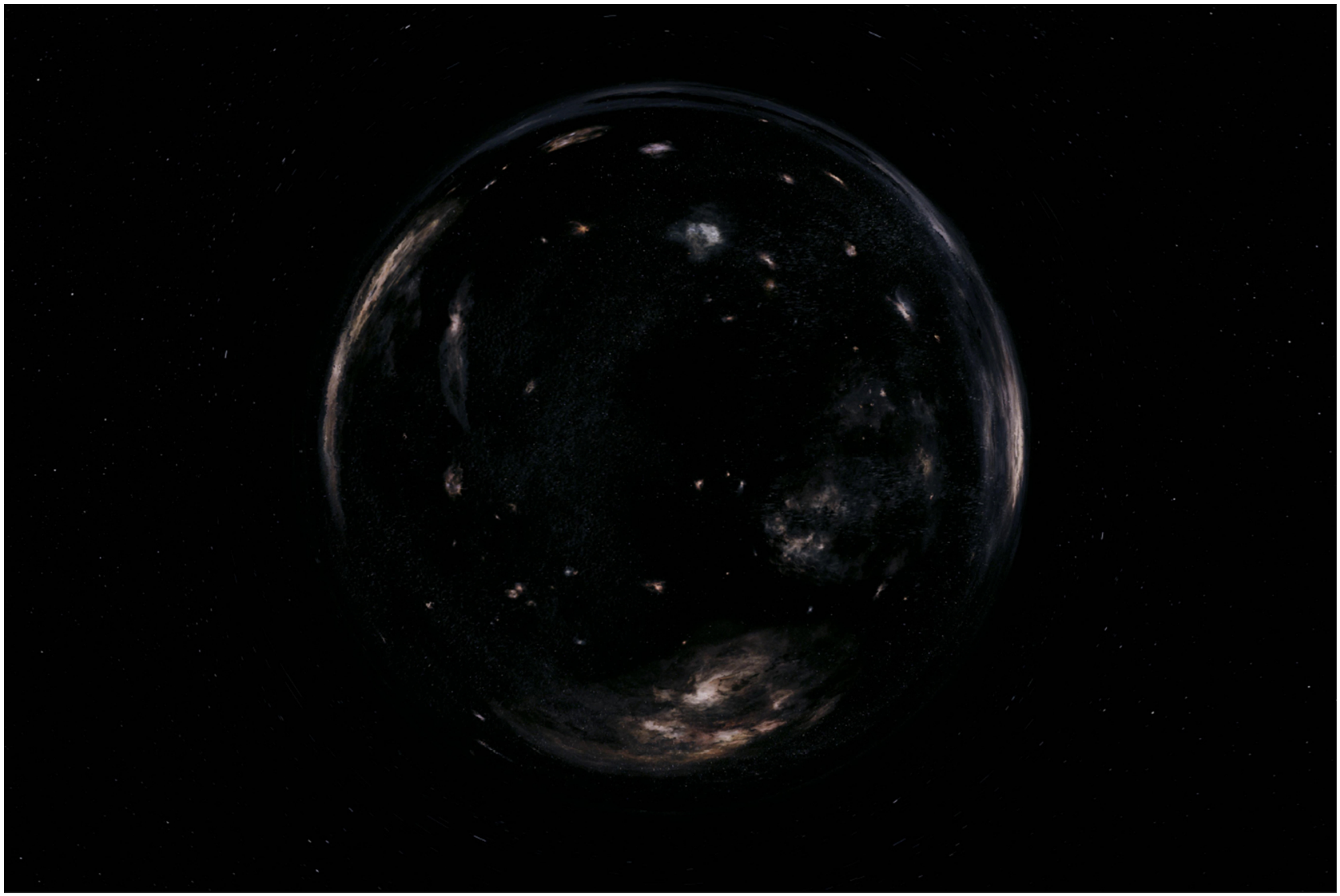
Gravitational anomalies in reality.

- 1850 - Not much luck so far.
  - Anomalous precession of Mercury, galaxies around each other and acceleration of the expansion of the universe can all be explained



- LISA Pathfinder
  - Low-frequency gravitational wave detection: it will put two test masses in a near-perfect gravitational free-fall, and control and measure their motion with unprecedented accuracy.

Wormhole



Wormhole

Film:

- Is set up by future human beings.
- Can be explained by the ‘bulk’.
- Is large enough to travel through.
- Is stable for hundreds of Earth years.

Wormhole

Reality:

- Highly unstable.
- Minuscule - Einstein claimed quantum foam, 10^{-35}m
- Fabric of spacetime needs to be flexible.
- Therefore HIGHLY IMPROBABLE.

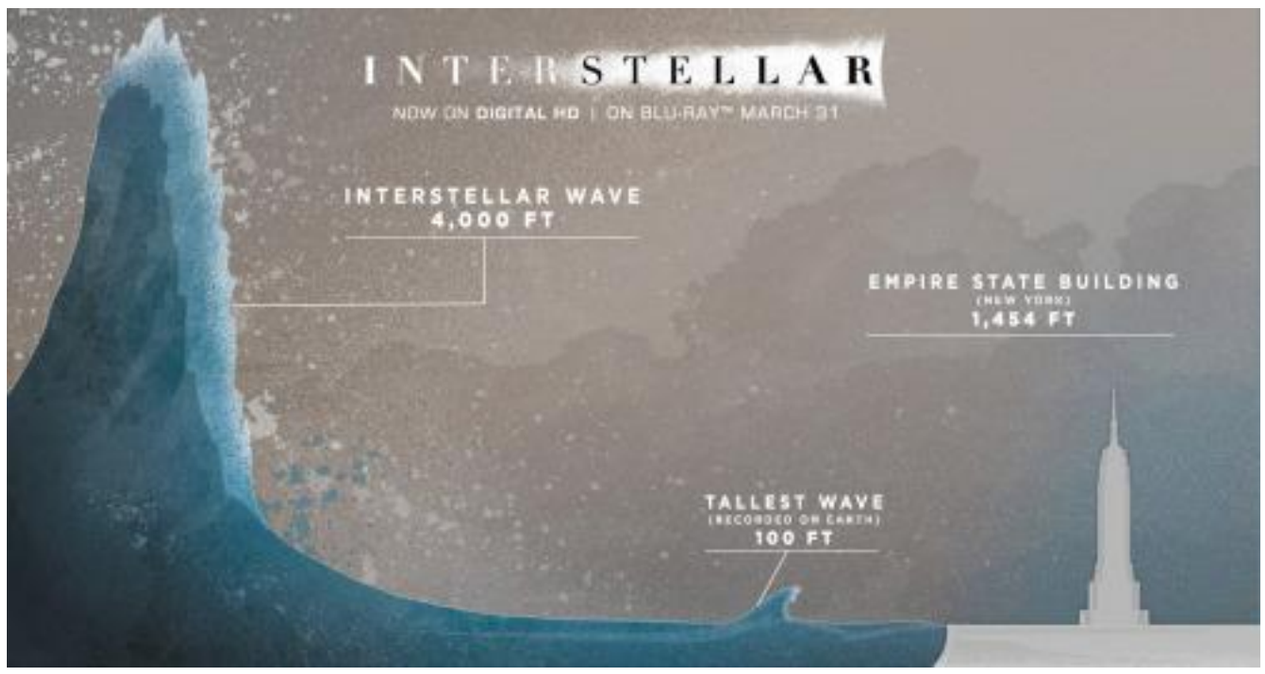
Planets visited

Planet 1 - Miller's Planet

- General Relativity warps spacetime drastically. 1 hour becomes 7 years!
- HUGE waves caused by the gravitational pull of the nearby black hole.

Planet 2 - Dr. Mann's planet

- Ice clouds present in the atmosphere.



Black Hole

Black Hole

Before the event horizon

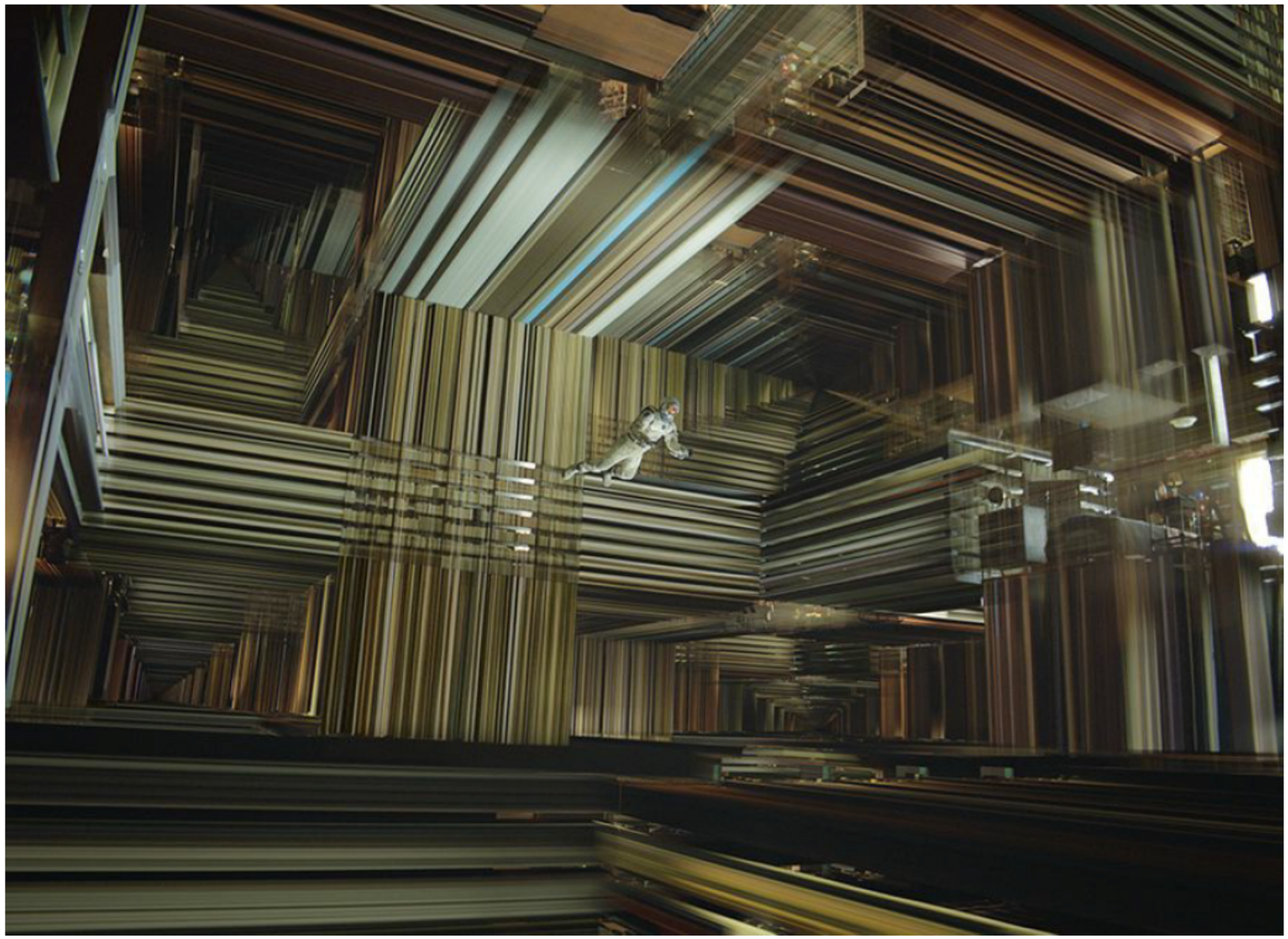
- Appears to slow, freeze then wavelength gets longer until it is unobservable.
- Signals sent from ranger arrive up to an hour late, but signals sent to ranger arrive normally.

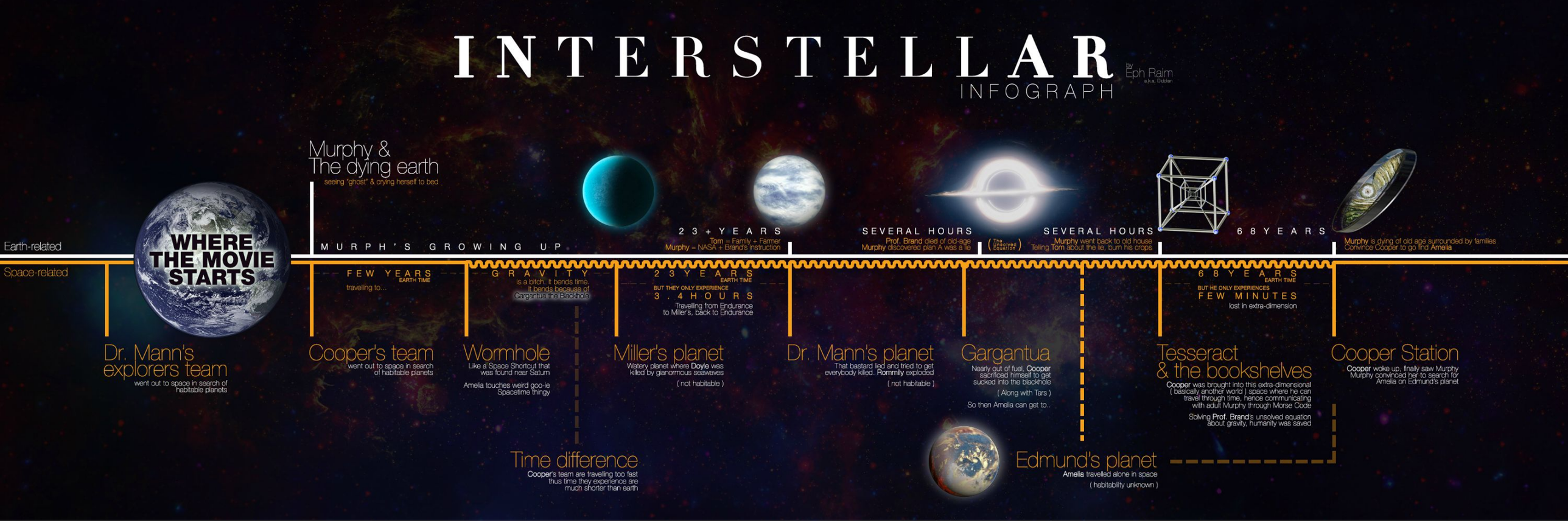
Past the event horizon.

- Gravitational forces tear the ranger apart after Cooper ejects himself.
- Rescued by the ‘Tesseract’.

Higher Dimensions

- 1D - Line
- 2D - Square
- 3D - Space
- 4D - Time
- 5D - ‘Out-back’




INTERSTELLAR
by Eph Raim a.k.a. Diddan
INFOGRAPH
Murphy & The dying earth
seeing "ghost" & crying herself to bed
WHERE THE MOVIE STARTS
Earth-related
Space-related
MURPH'S GROWING UP
23+ YEARS
Tom = Family + Farmer
Murphy = NASA + Brand's instruction
SEVERAL HOURS
Prof. Brand died of old-age
Murphy discovered plan A was a lie
(The Unsolved Equation)
SEVERAL HOURS
Murphy went back to old house
Telling Tom about the lie, burn his crops
68 YEARS
Murphy is dying of old age surrounded by families
Convince Cooper to go find Amelia
Dr. Mann's explorers team
went out to space in search of habitable planets
FEW YEARS EARTH TIME
travelling to...
Cooper's team
went out to space in search of habitable planets
GRAVITY
is a bitch. It bends time.
It bends because of Gargantua the Blackhole
Wormhole
Like a Space Shortcut that was found near Saturn
Amelia touches weird goo-ie Spacetime thingy
23 YEARS EARTH TIME
BUT THEY ONLY EXPERIENCE
3.4 HOURS
Travelling from Endurance to Miller's, back to Endurance
Miller's planet
Watery planet where Doyle was killed by gianormous seawaves
(not habitable)
Dr. Mann's planet
That bastard lied and tried to get everybody killed. Rommily exploded
(not habitable)
Gargantua
Nearly out of fuel, Cooper sacrificed himself to get sucked into the blackhole
(Along with Tars)
So then Amelia can get to..
68 YEARS EARTH TIME
BUT HE ONLY EXPERIENCES
FEW MINUTES
lost in extra-dimension
Tesseract & the bookshelves
Cooper was brought into this extra-dimensional (basically another world) space where he can travel through time, hence communicating with adult Murphy through Morse Code
Solving Prof. Brand's unsolved equation about gravity, humanity was saved
Cooper Station
Cooper woke up, finally saw Murphy
Murphy convinced her to search for Amelia on Edmund's planet
Time difference
Cooper's team are travelling too fast thus time they experience are much shorter than earth
Edmund's planet
Amelia travelled alone in space
(habitability unknown)

Thank you!