WHAT'S A... SUPERNOVA?

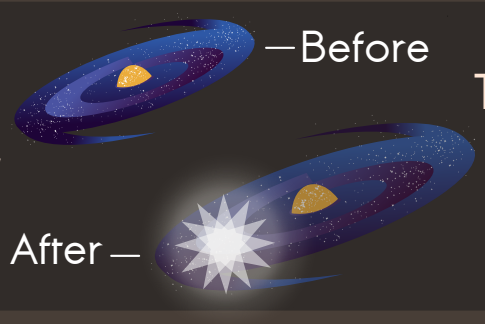
A SUPERNOVA is an explosion resulting from the death of certain stars.

In Latin *super*, means *beyond* or *above*.

SUPERNOVA

Nova is Latin for *new*

Although supernova means *"brighter new star"* it is not a star.



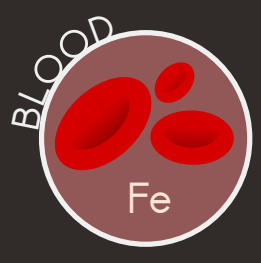
They are stellar explosions which can outshine their own galaxy.

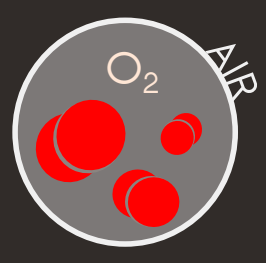
No Supernova, No life.

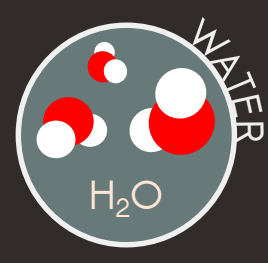
Supernovae release the elements that surround us.

The calcium in your bones

The iron in your blood







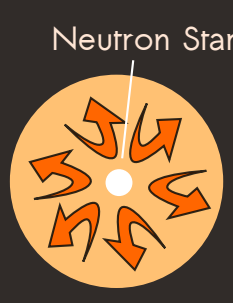
The oxygen in the air you breath and the water you drink

Supernovae can result from the death of 2 types of stars

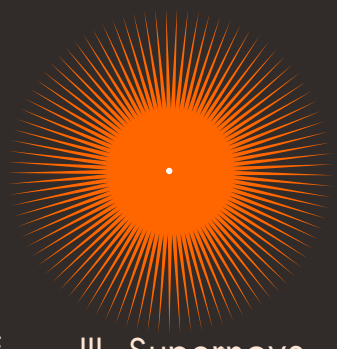
MASSIVE STARS or WHITE DWARFS

Massive stars are born with at least 8 times the mass of the Sun. When they get old, their **core collapses** into **neutron stars** or **black holes**. The **envelope** of the star **violently bounces off**, causing what we call a **core collapse supernova**.

I. Core Collapse

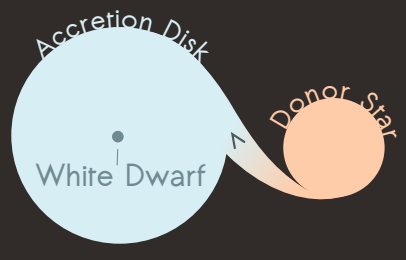


II. Bounce off



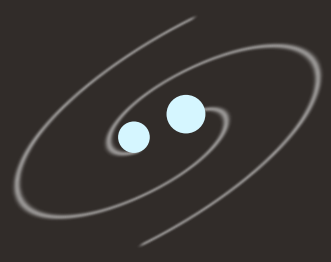
III. Supernova

When a star born with less than 8 times the mass of the sun dies, it leaves behind another star: a **White Dwarf**.



White Dwarf steals materials from another Star

White Dwarfs merger



If the White Dwarf **gains too much mass** during its life, it will explode into a **thermonuclear supernova**.

A single supernova can release 10^{44} Joules of energy.

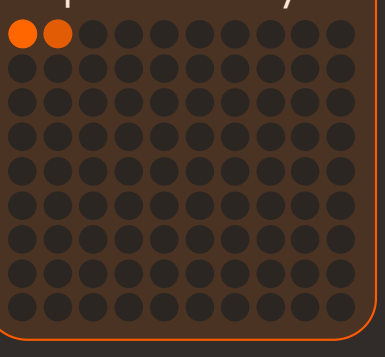
That's 10 billion trillion (10^{22}) times more energy than the whole of humanity has produced so far.

Only a tiny fraction of their energy is turned into light

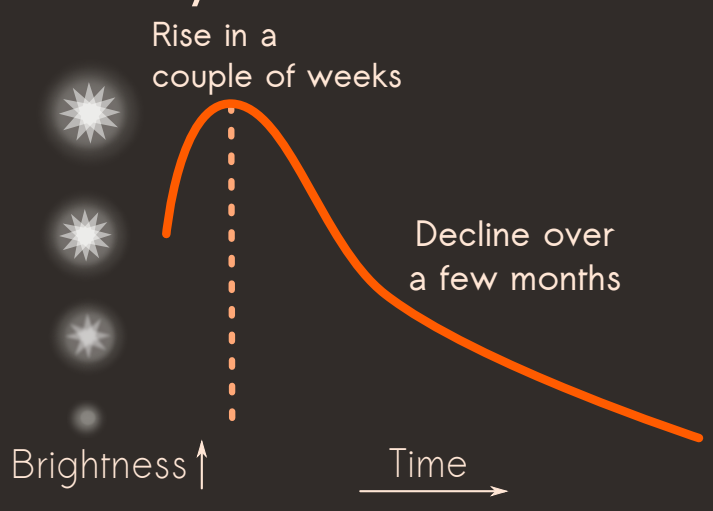
They can be as bright as 10 BILLION

They are rare

1-2 per galaxy per century



They are short-lived



BUT...

...the Universe is big and supernovae are bright, so we can see them from a very long distance.

In 2018 alone we found ~1,250 new supernovae!

NB: Supernovae are generally too far to see without a telescope. Only 3 were close enough in the past 500 years!