WHAT'S A... SUPERNOVA?

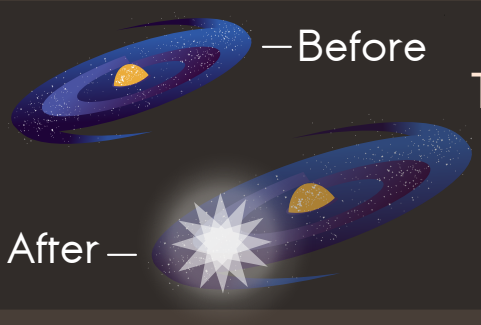
A SUPERNOVA is an explosion resulting from the death of certain stars.

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.

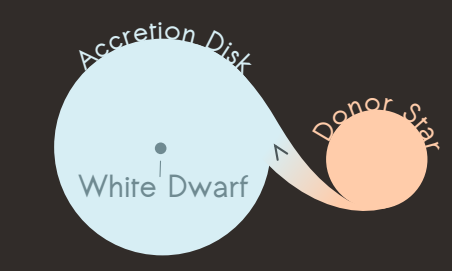
Supernovae can result from the death of 2 types of stars

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**.

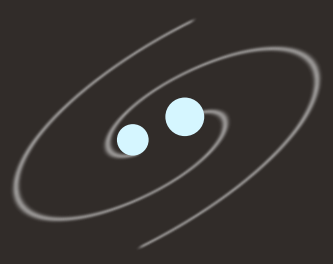
I. Core Collapse — II. Bounce off — III. Supernova

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.

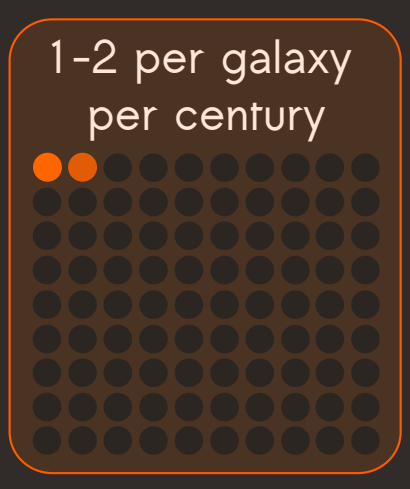
That's **10 billion trillion** (10^{22}) times **more energy** than **the whole of humanity** has produced so far.

Only a **tiny fraction** of their energy is turned into **light**

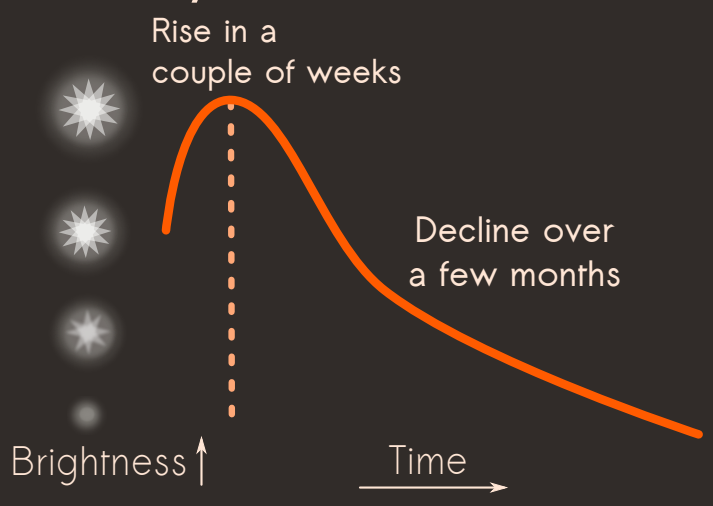
They can be as **bright** as **10 BILLION SUNS**

They are **rare**

1-2 per galaxy per century



They are **short-lived**



BUT...

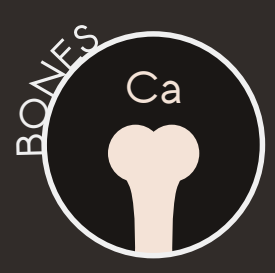
...the Universe is big and supernovae are bright, so **we can see them from a very long distance.**

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

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

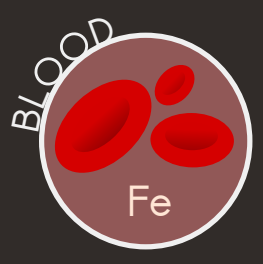
No Supernova, No life.

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