

ONCE THE STAR REACHES THE MAIN SEQUENCE STAGE ITS FURTHER EVOLUTION DEPENDS ON ITS MASS

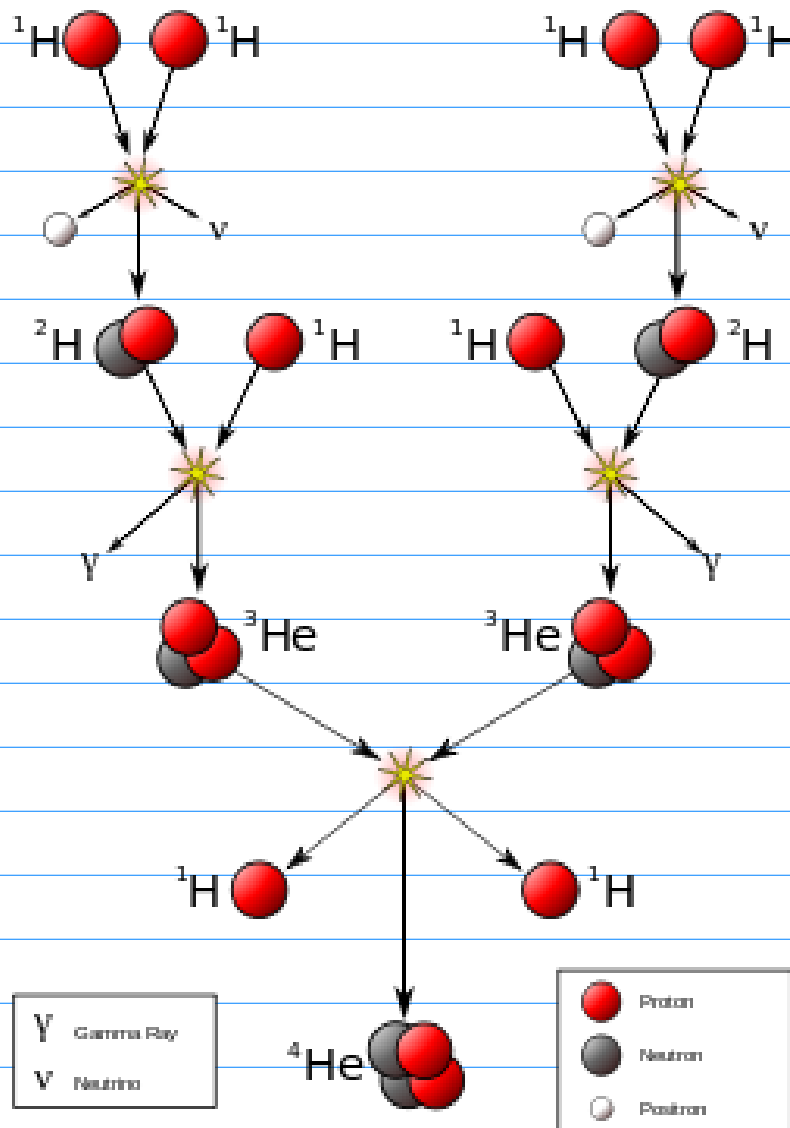
IF THE MASS OF THE CONTRACTING CLUMP IS LESS THAN $\frac{1}{12} M_{\odot} = 0.08 M_{\odot}$ ITS CORE NEVER GETS HOT ENOUGH TO FUSE HYDROGEN INTO HELIUM (IT DOES NOT REACH THE MAIN SEQUENCE STAGE). IT FORMS SO-CALLED BROWN DWARF. PLANET JUPITER COULD BE VIEWED AS A BROWN DWARF.

LOW MASS STARS: $0.08 M_{\odot} \leq M < 0.5 M_{\odot}$

↑
MASS OF
THE STAR

↑
SOLAR
MASS

THEY FUSE HYDROGEN INTO HELIUM VIA SO-CALLED PROTON-PROTON CHAIN:



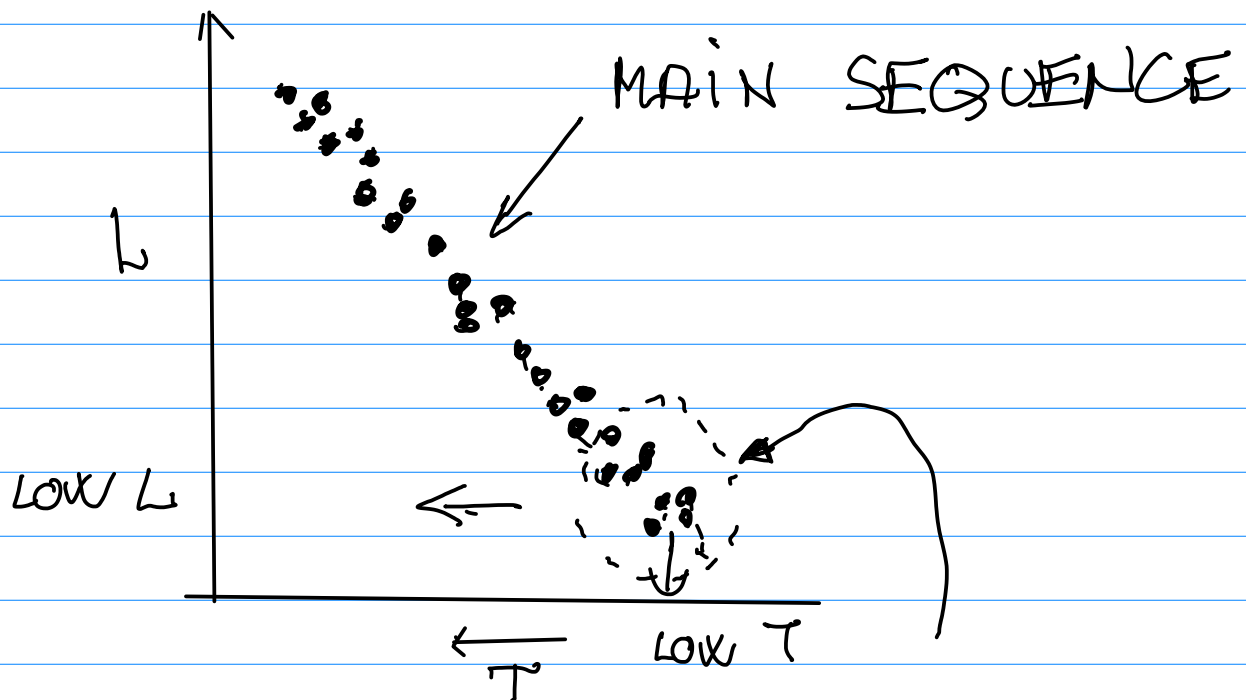
NET RESULT IS : $(6 - 2) = 4$ PROTONS
 ARE FUSED INTO THE NUCLEUS OF ${}^4\text{He}$
 WITH RELEASE OF ENERGY. THE MASS
 OF ${}^4\text{He}$ IS SLIGHTLY SMALLER THAN THE
 MASS OF FOUR PROTONS USED TO MAKE IT

$$m = 4 \cdot \text{MASS OF } {}^1\text{H} - \text{MASS OF } {}^4\text{He}$$

$$E = mc^2$$

\uparrow ENERGY RELEASED \leftarrow (SPEED OF LIGHT IN VACUUM)

BECAUSE OF THEIR LOW MASS THEIR LUMINOSITY IS LOW ($L = M^{3.5}$) AND THEY ARE AT THE BOTTOM OF MAIN SEQUENCE (DIM & COOL STARS)



THEY FORM SO-CALLED RED DWARFS: RED (LOW SURFACE TEMPERATURE) DWARFS ($L = \text{const. } R^2 T^4$). LIKELY THE MAJORITY OF THE STARS IN THE UNIVERSE ARE RED DWARFS,

BUT THEY ARE HARD TO OBSERVE BECAUSE OF THEIR LOW LUMINOSITY:

$L \leftarrow$ LUMINOSITY

$$B = \frac{L}{4\pi d^2}$$

BRIGHTNESS

DISTANCE TO THE STAR

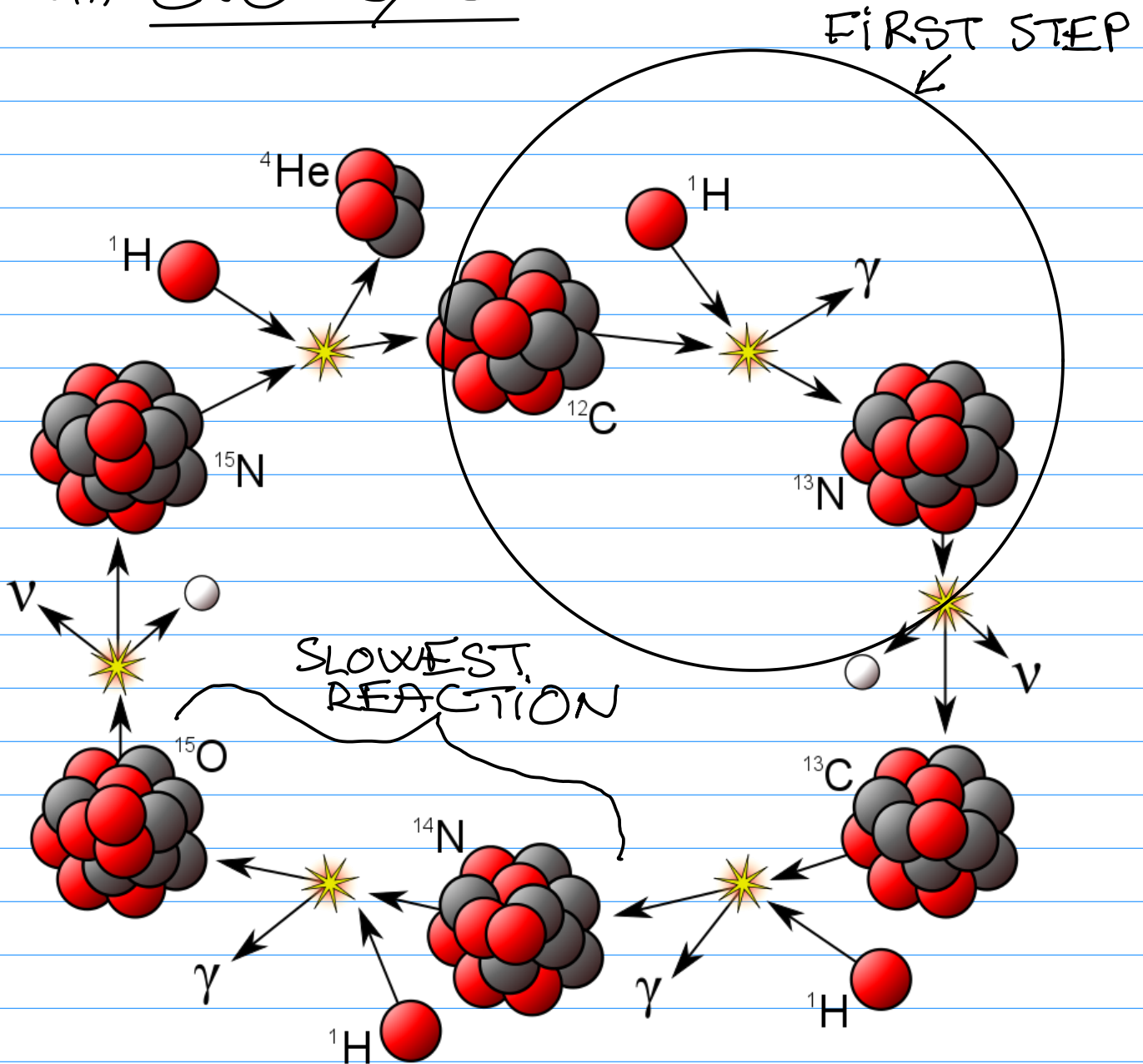
$L_c =$ (AMOUNT OF ENERGY EMITTED BY THE STAR PER UNIT TIME PER UNIT AREA AT THE LOCATION OF THE OBSERVER)




PROXIMA CENTAURI (A MEMBER OF THE TRIPLE STAR SYSTEM ALPHA-CENTAURI) IS A RED DWARF AND WE CANNOT OBSERVE WITH NAKED EYE IN SPITE OF THE FACT THAT IT IS THE STAR CLOSEST TO US (DISTANCE = 4.24 ly).

MEDIUM MASS STARS: $0.5M_{\odot} < M < 8M_{\odot}$

STARS WITH MASS $< 2M_{\odot}$ FUSE HYDROGEN VIA PROTON-PROTON CHAIN

STARS WITH MASS $> 2M_{\odot}$ FUSE HYDROGEN VIA CNO-CYCLE:



	Proton	γ	Gamma Ray
	Neutron	ν	Neutrino
	Positron		