Axion effect on the minimum stellar mass that experiences central carbon burning, Mup

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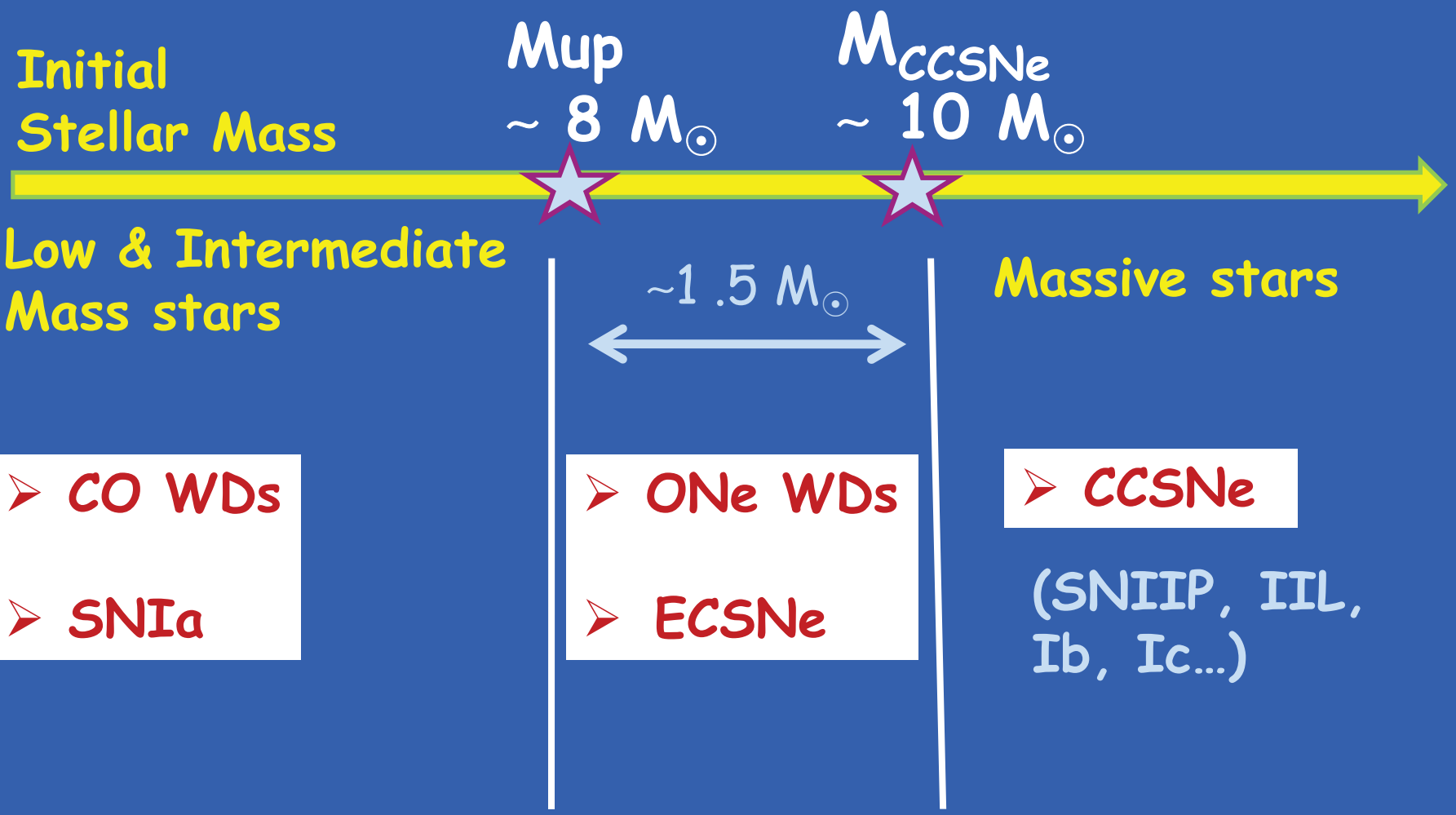
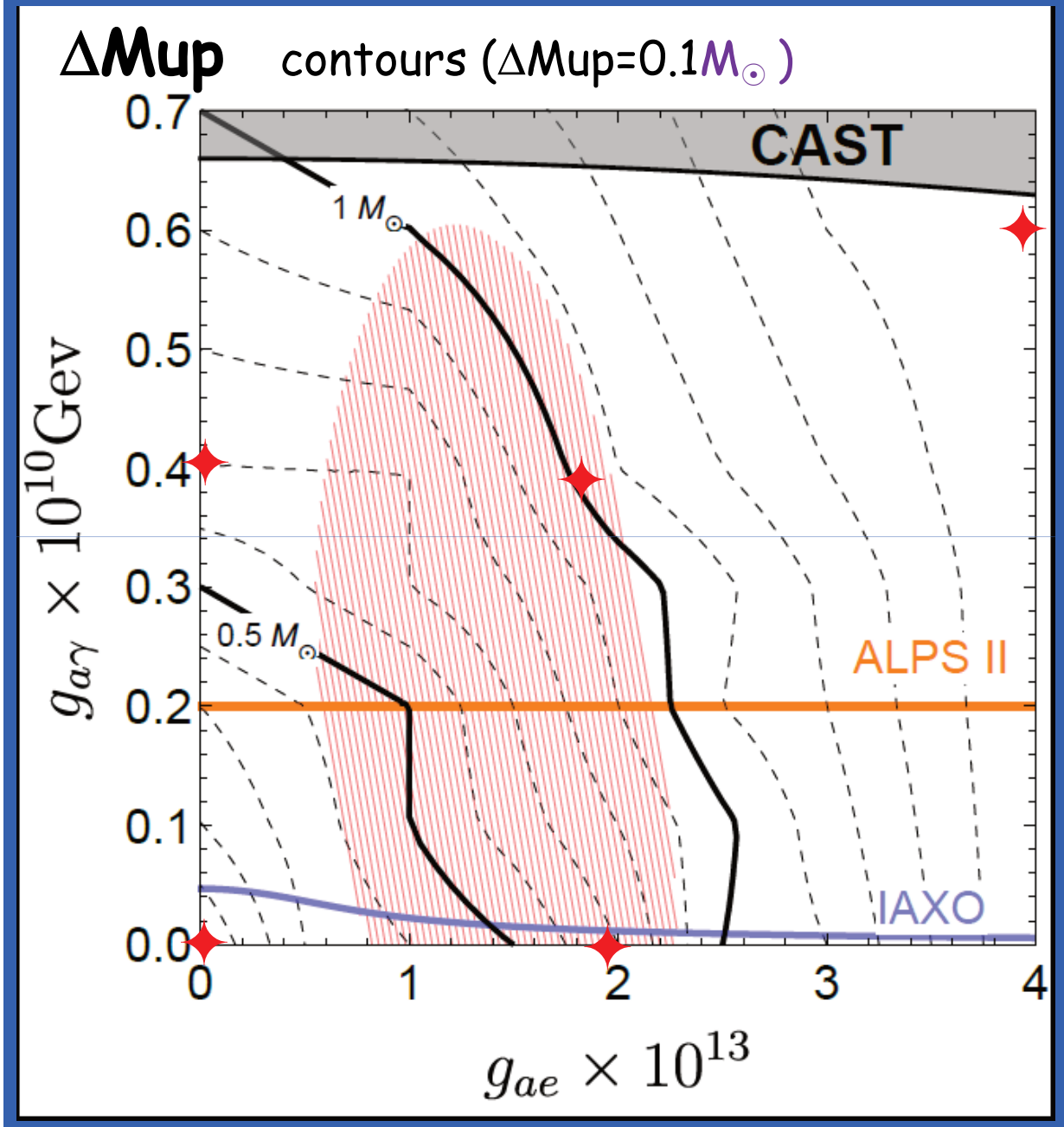
Why Mup ?


Initial
Stellar Mass
Mup
~ 8 M⊙
MCCSNe
~ 10 M⊙
Low & Intermediate
Mass stars
~1 .5 M⊙
Massive stars
➢ CO WDs
➢ SNIa
➢ ONe WDs
➢ ECSNe
➢ CCSNe
(SNIIP, IIL,
Ib, Ic…)



Impact of axions on Mup

M_{ini}:
7.0 – 11 $M_\odot$
Y = 0.26 Z = 0.014

ge_{13}: 0 – 4
Δge_{13} = 0.5

$g\gamma_{10}$: 0 – 1 GeV^{-1}
$\Delta g\gamma_{10}$ = 0.1 GeV^{-1}

In red 2σ region
of astrophysical hints
(WDs + HB + RGB)

Some results

Axions may increase Mup: 7.5 → 8.6 $M_\odot$ (9.2) $M_\odot$

for current constraints (DFSZ) on g_{ae} & $g_{a\gamma}$

also CO core mass needed for C-ignition

M_{CO}: 1.09 → 1.13 (1.16) $M_\odot$

So, **influence:**

→ High mass end of the IFMR →

- **CO WD maximum mass ↑**: 1.11 (1.14) $M_\odot$
- **SNIa rates ↑** (more stars end as CO WDs)
- **Younger SNIa progenitors (1/3 Age)**
- **CCSN rates**

→Mup & Minimum progenitor mass of CCSNe ↑

Not leaving much room (if any) for axions with

$ge_{13} > 2.4$ & $g\gamma_{10} > 0.6$ GeV^{-1}