Globular Cluster Abundance Anomalies and the Massive Binary Polluter Scenario

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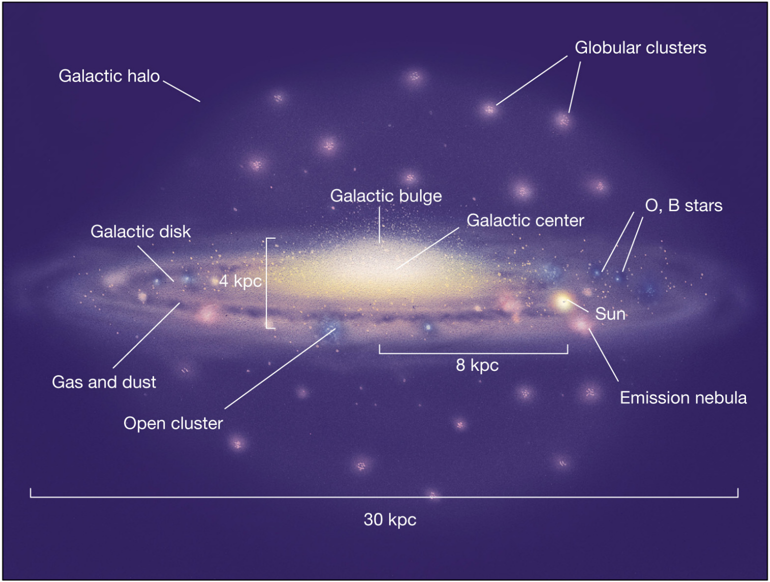
Abundance anomalies observed in Galactic Clusters (GCs)

Globular Clusters & Abundance Anomalies



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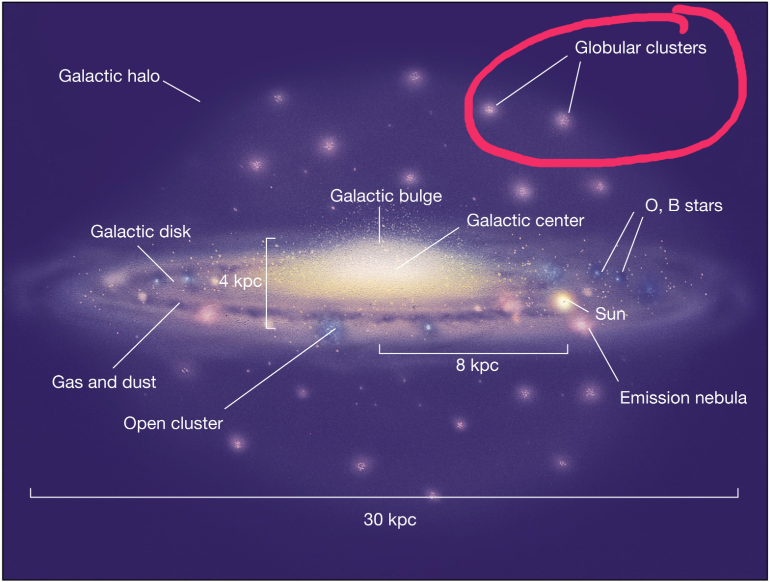

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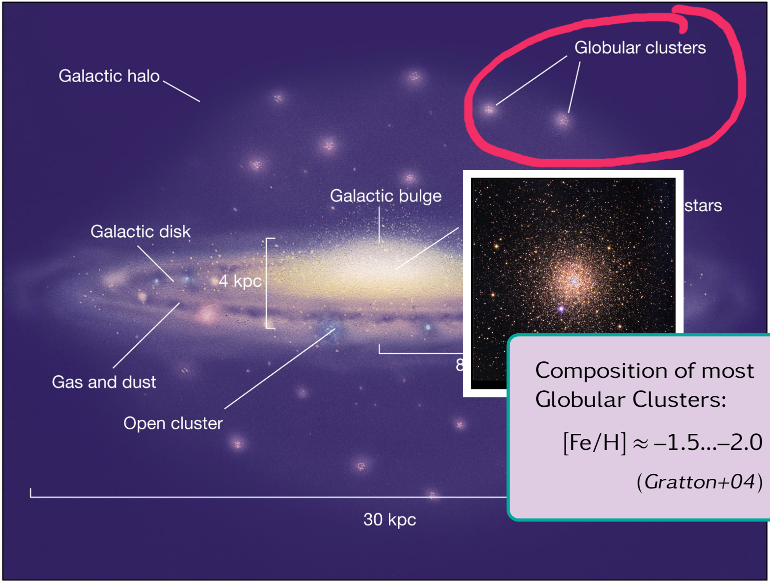

Composition of most Globular Clusters:

$[Fe/H] \approx -1.5 ... -2.0$

(*Gratton+04*)

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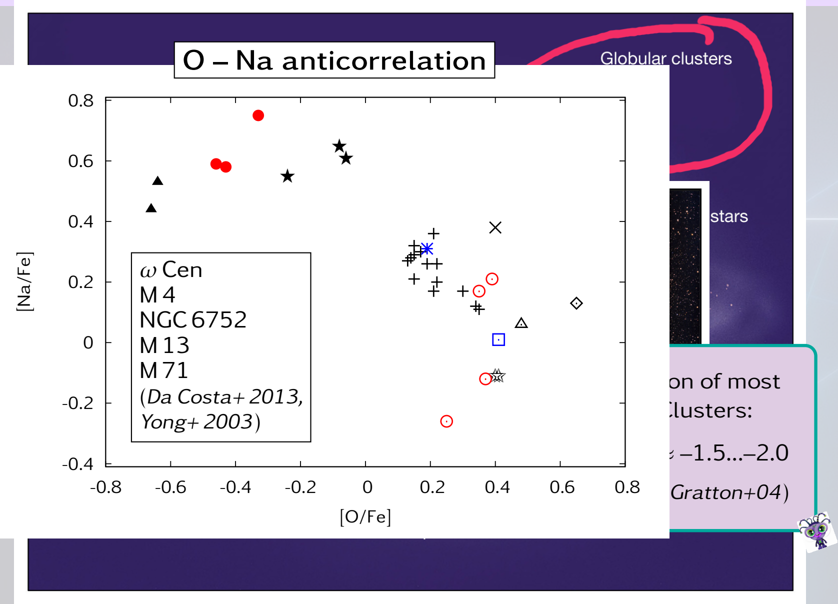

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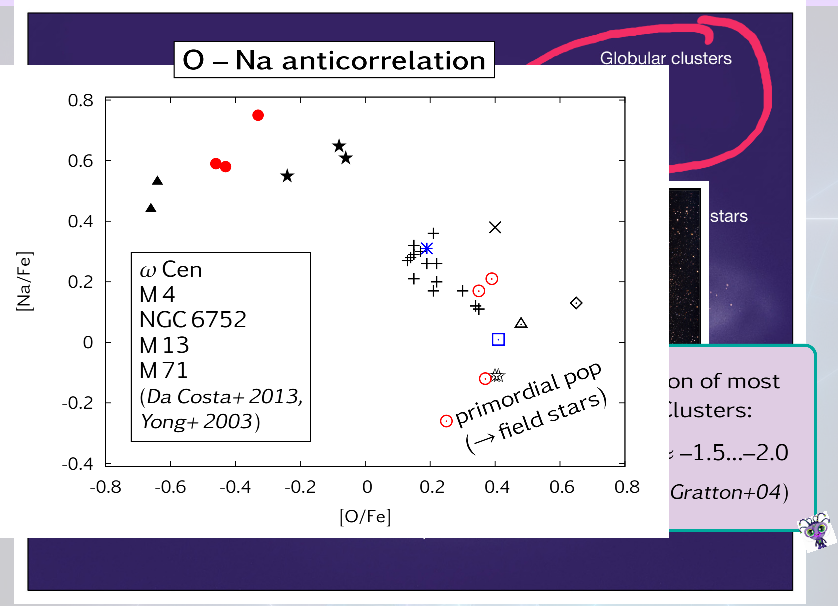

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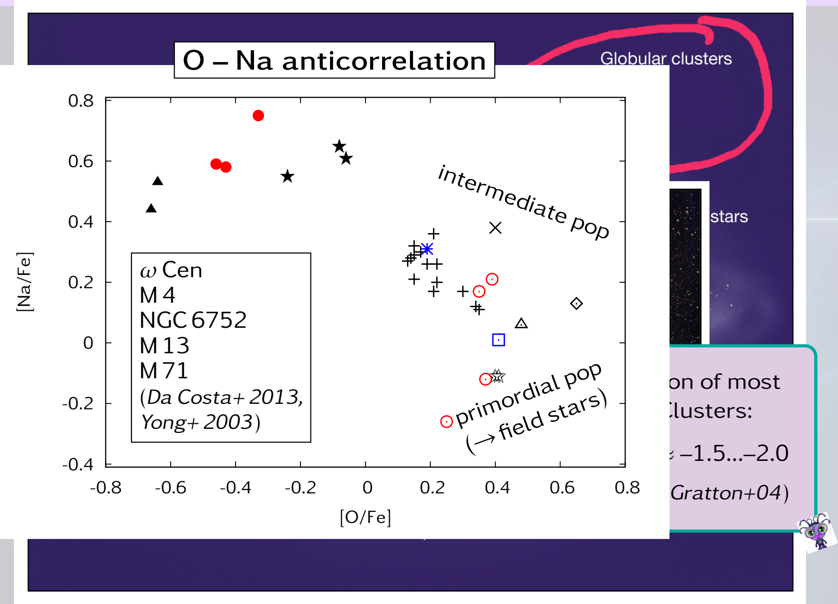

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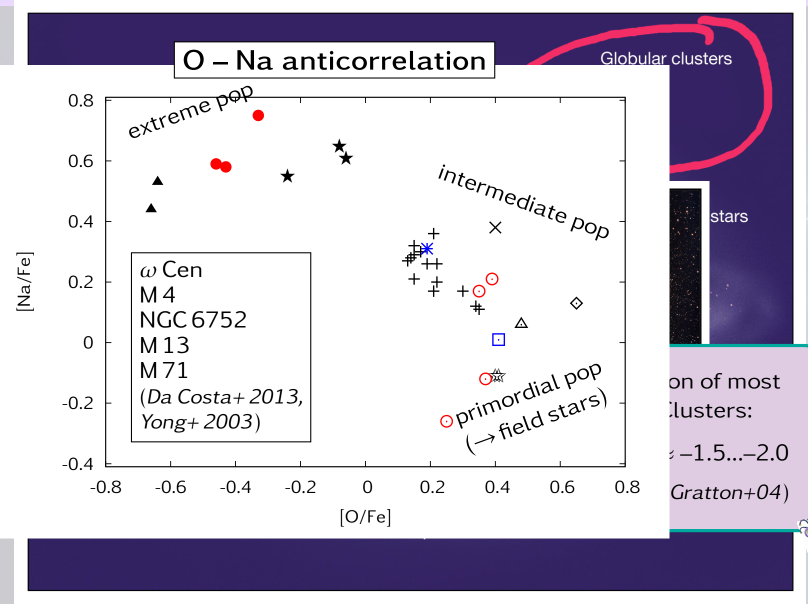

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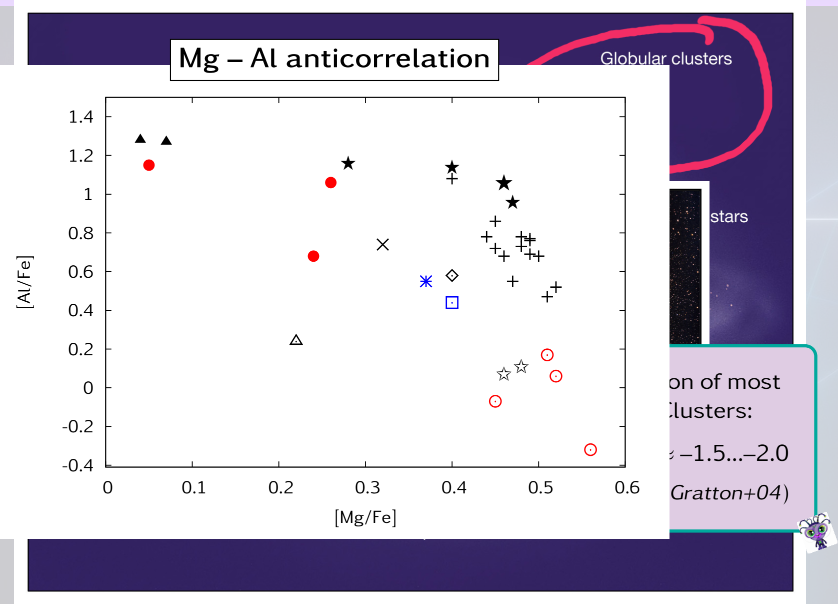

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    - AGB stars: hot bottom burning (*Ventura+ 2001*)
    - fast rotating massive stars: close to break-up (*Decressin+ 2007*)
    - supermassive stars (10^4 $M_\odot$): continuum-driven wind (*Denissenkov+ 2014*)
    - massive binaries: non-conservative mass transfer (*de Mink+ 2009*)

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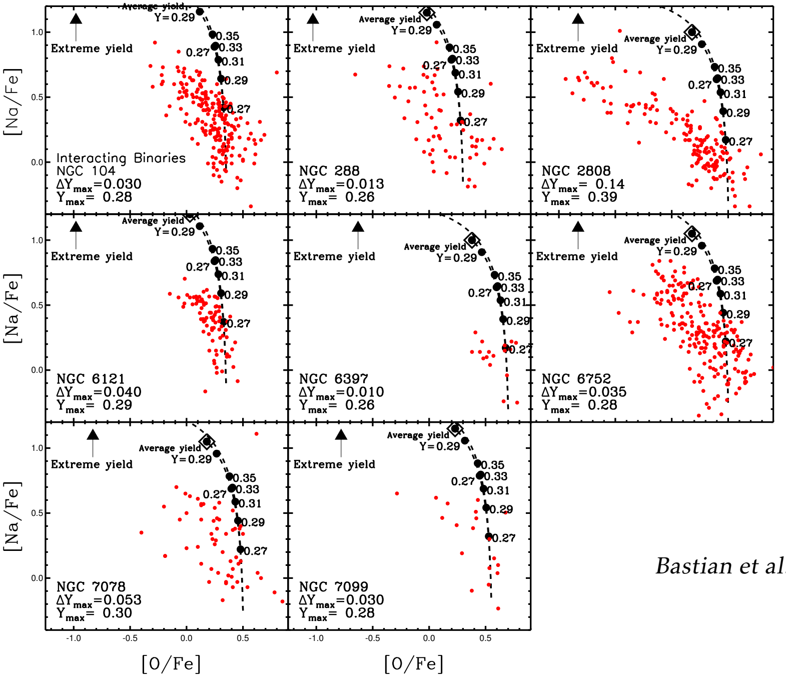
- *De Mink+ 2009*: **20 $M_\odot$ + 15 $M_\odot$ + 12 days** ([Fe/H]=−1.5)



Bastian et al. 2015

Other systems?

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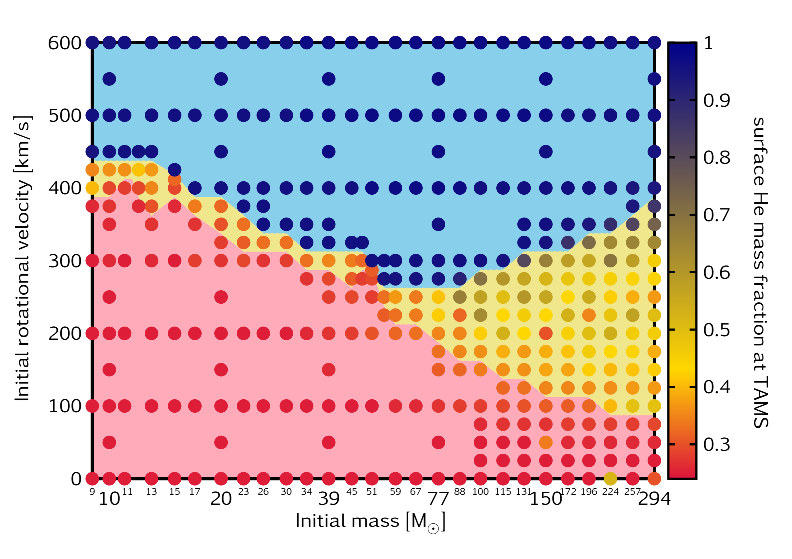
- Would their ejecta composition reproduce the observed anticorrelations?

Single star approach

to the Massive Binary Polluter Scenario

A grid of low metallicity *single* stars

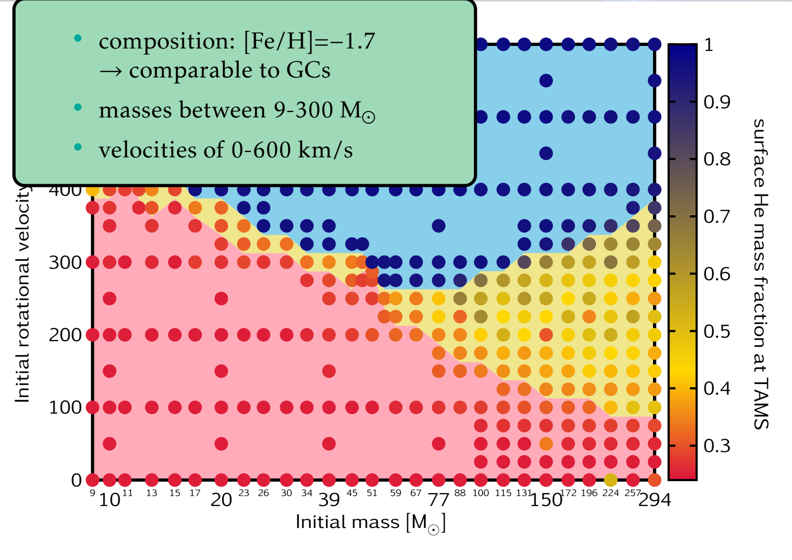
Szécsi et al. 2015



A grid of low metallicity *single* stars

Szécsi et al. 2015

- composition: [Fe/H]=−1.7
  → comparable to GCs
- masses between 9-300 $M_\odot$
- velocities of 0-600 km/s



Compared to observations:

O – Na anticorrelation

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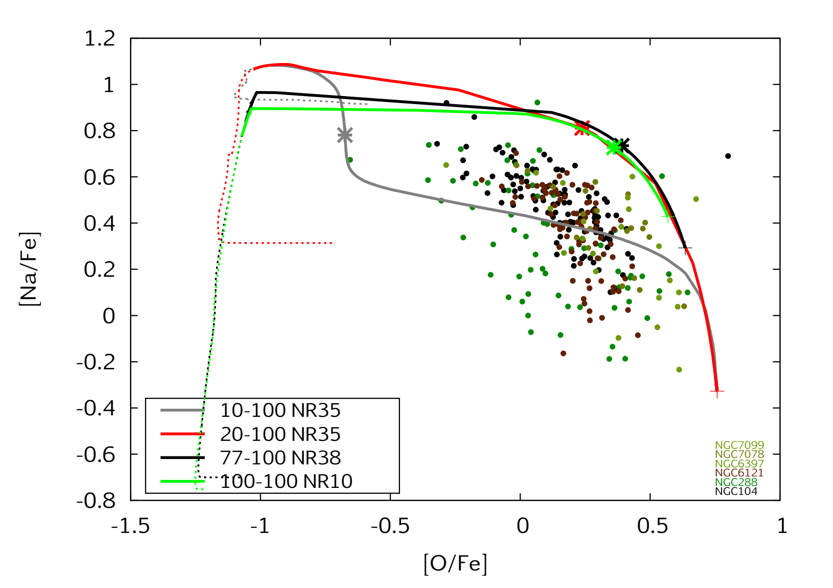

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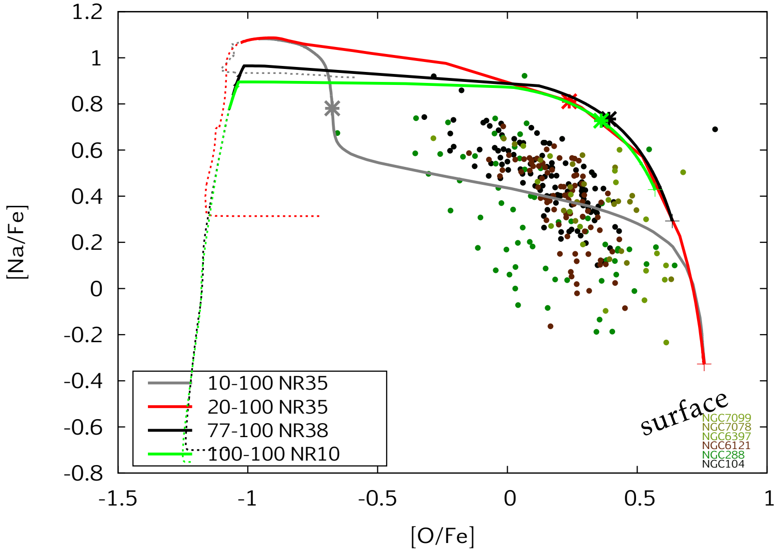

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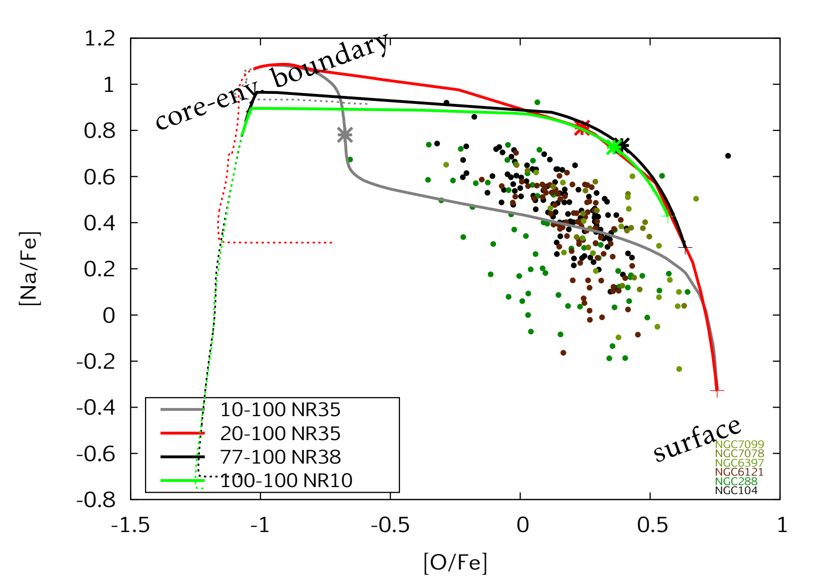

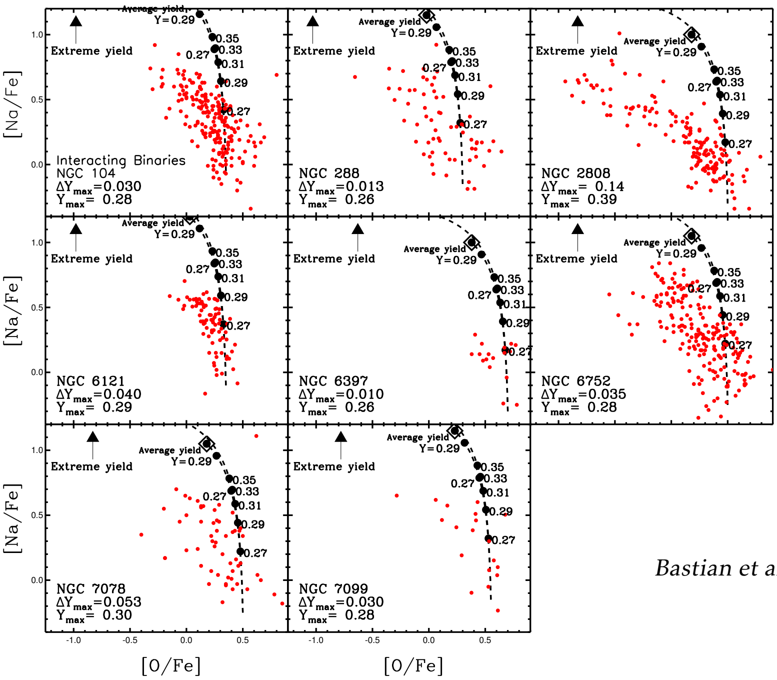

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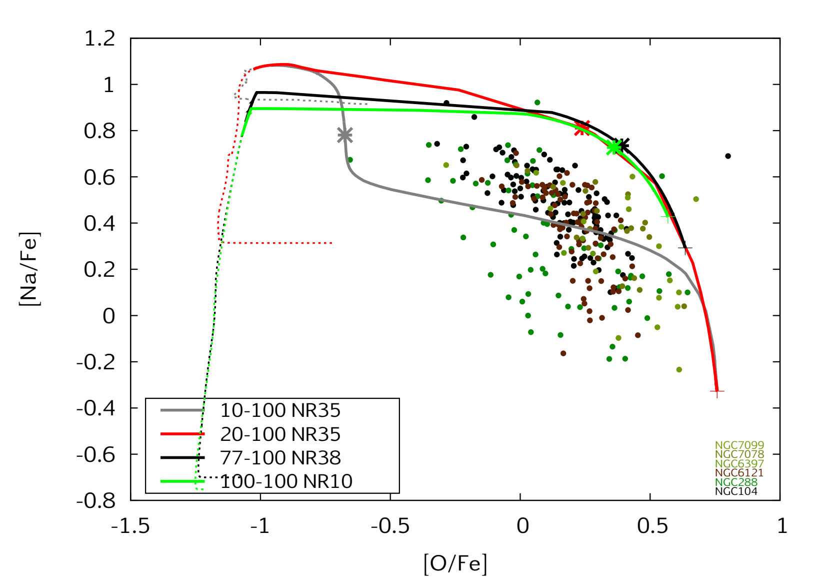

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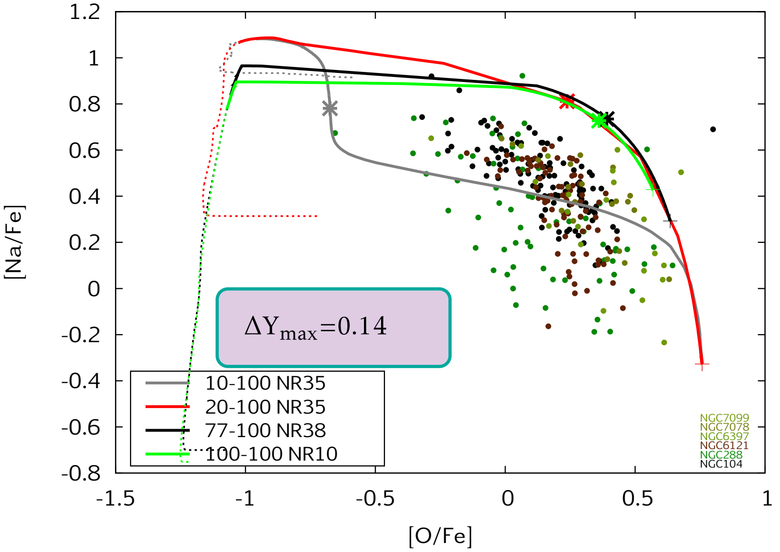

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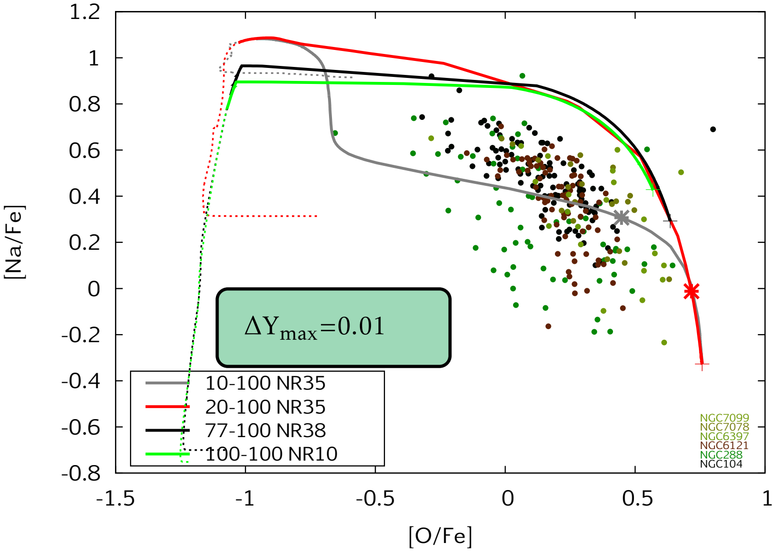

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- give **constraints on the massive binary polluter scenaro** even without detailed binary simulations