

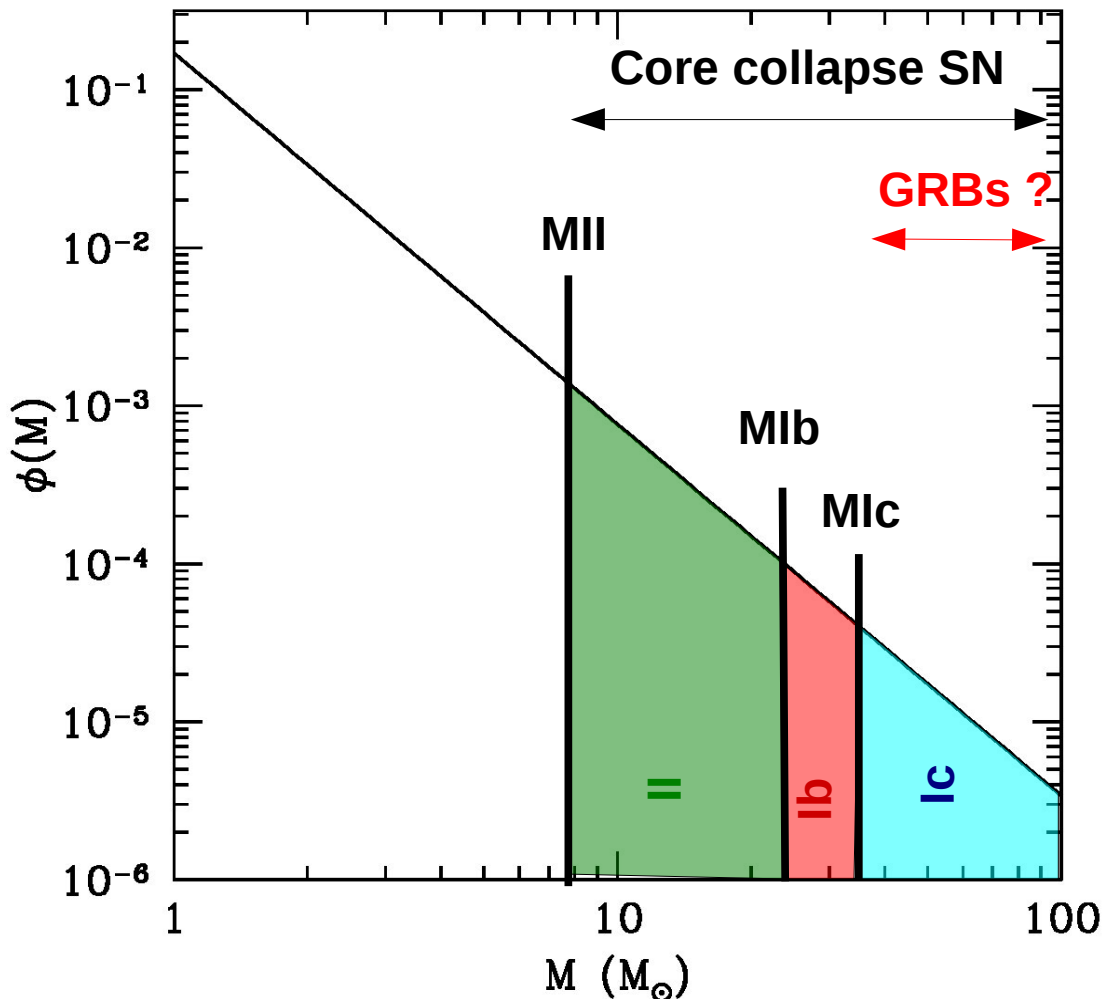
Relative frequencies of SN types & metallicity of the host galaxies

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Nikos Prantzos (IAP, Paris)*



What can we learn on **CC SN** from what we know about **galaxies** ?

Simplified view of **core collapse** SN in a galactic context:



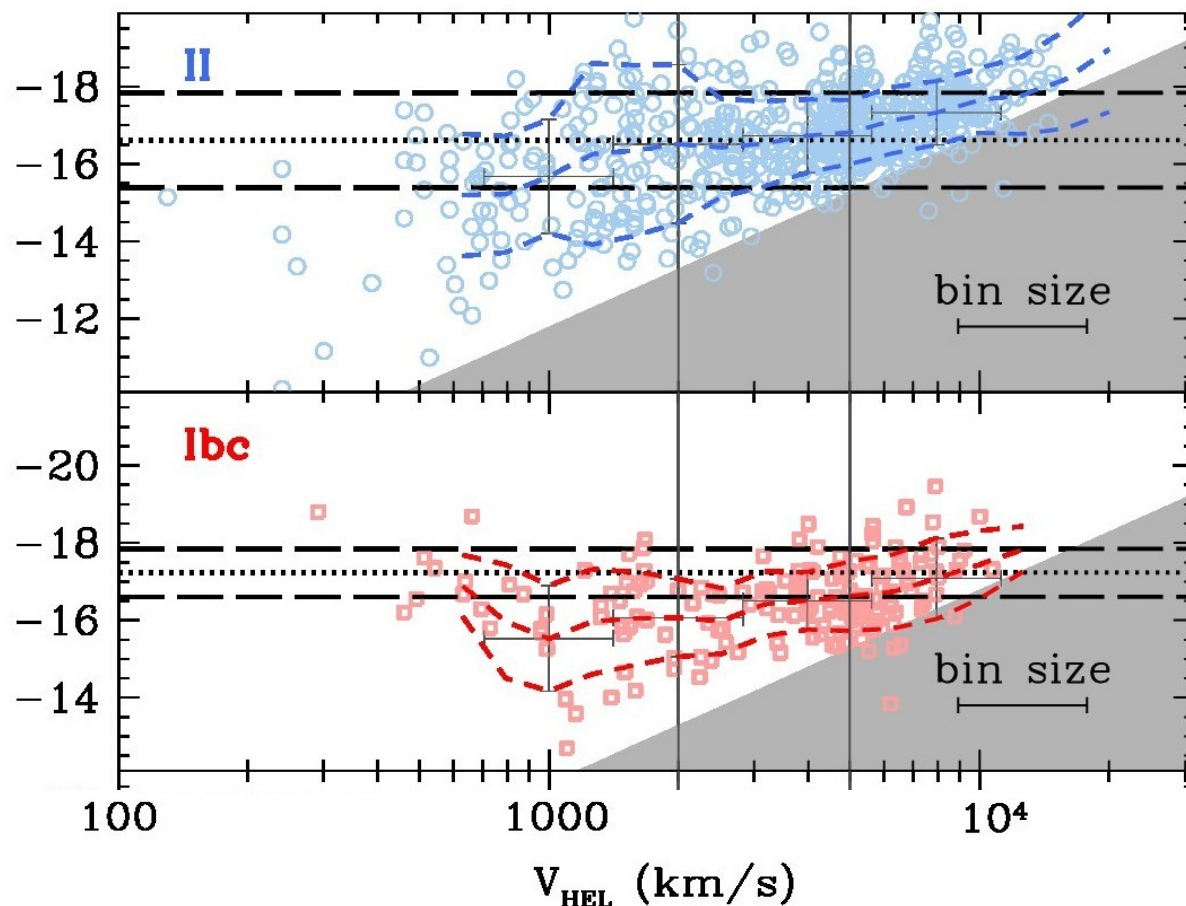
Various types of SN:
hierarchy of progenitor
masses

(e.g. Anderson & James 2008 ;
Kelly et al. 2008)

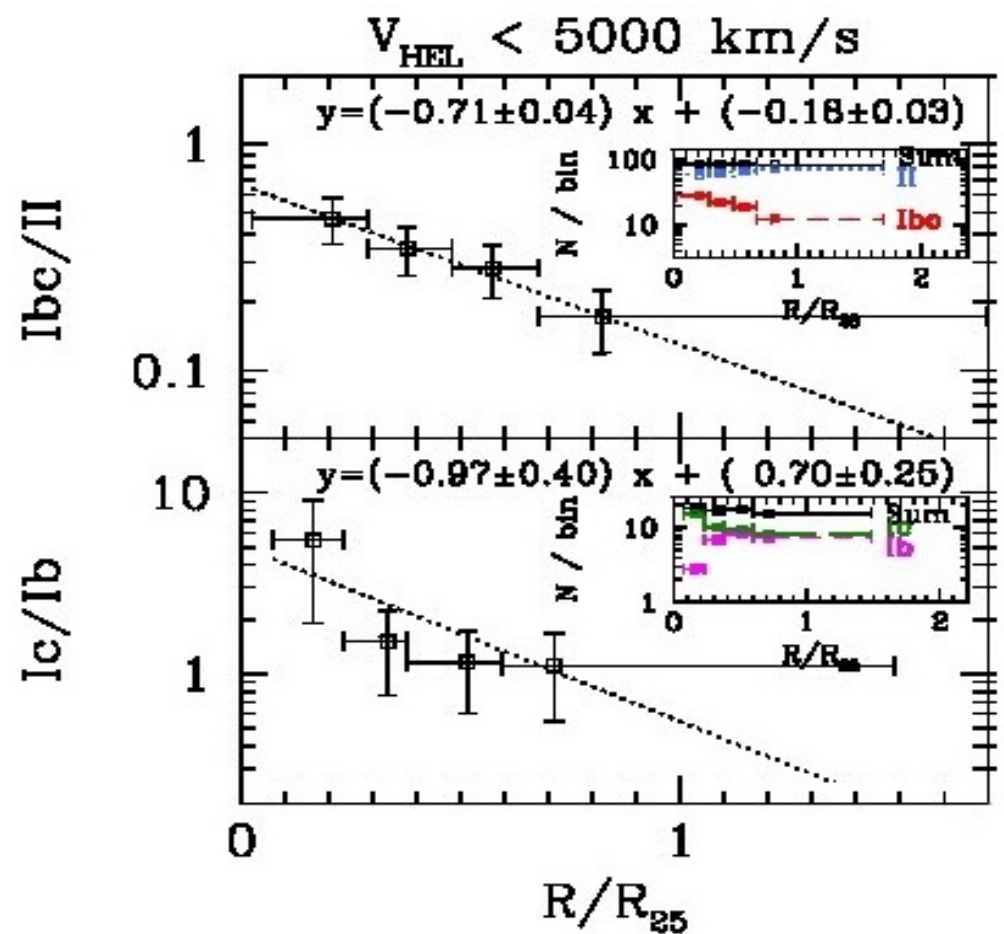
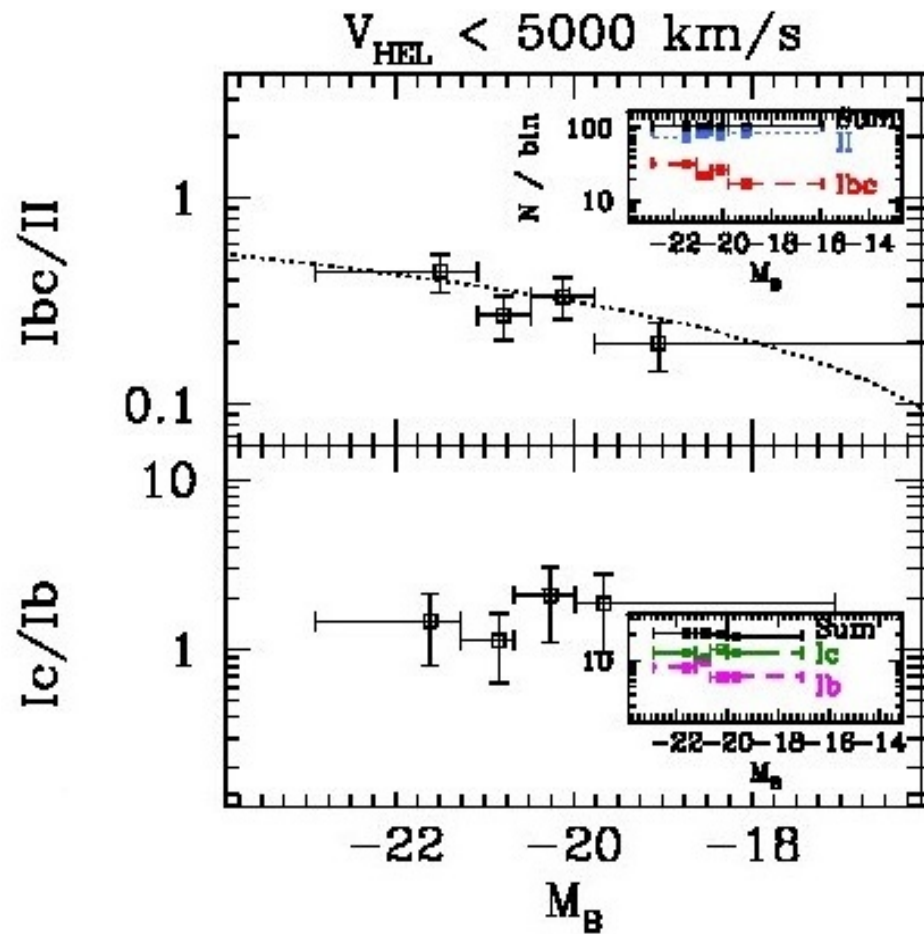
*For a universal IMF and
large samples, the
ratios of sub-types allow
to estimate the masses
 M_{II} , M_{Ib} , M_{Ic} .*

Large number (several 100s) of SN in Asiago catalogue: SN type, host galaxy, **offset** from center, absolute M_B of the host galaxy (LEDA)

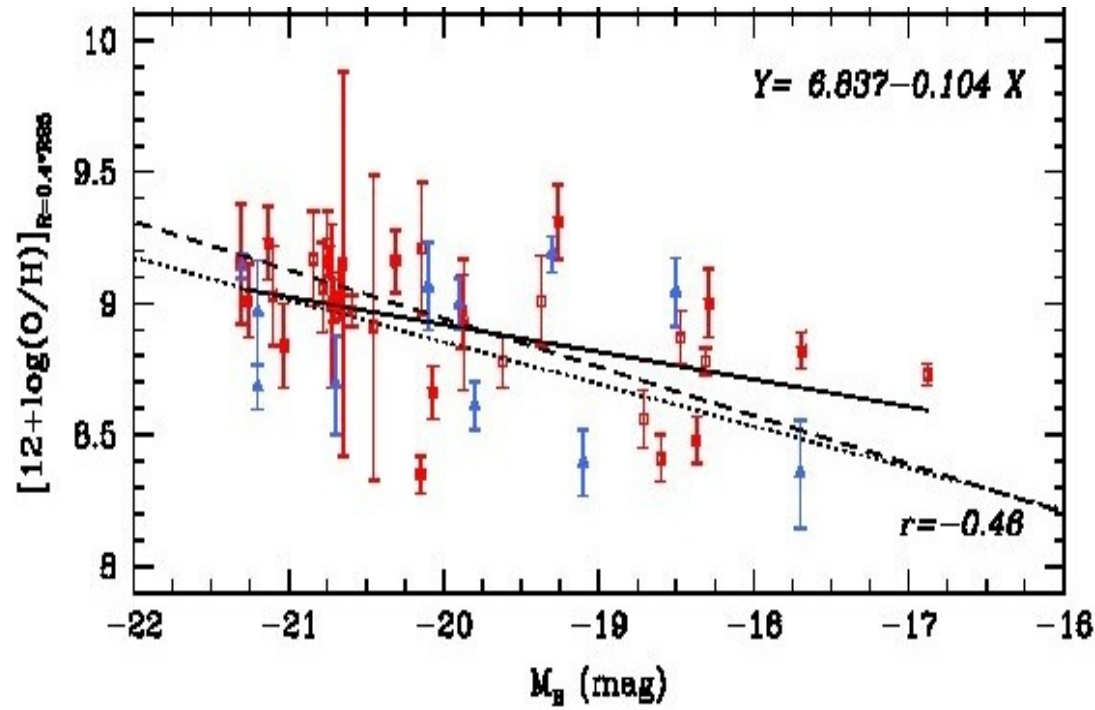
$V_{\text{HEL}} < 5000 \text{ km/s}$:



Empirical trends with host magnitude and offset Relative numbers of SN types

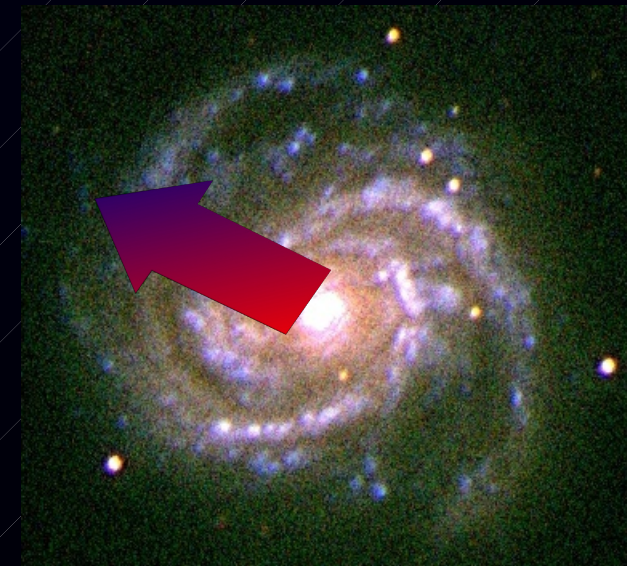


I_{bc}/II increases with M_B , decreases with offset M_B
 I_c/I_b : flat with M_B , increases towards center



Luminosity-metallicity
relationship (at a
characteristic radius)

- + Universal abundance gradient
in dex/R25 = **local metallicity**

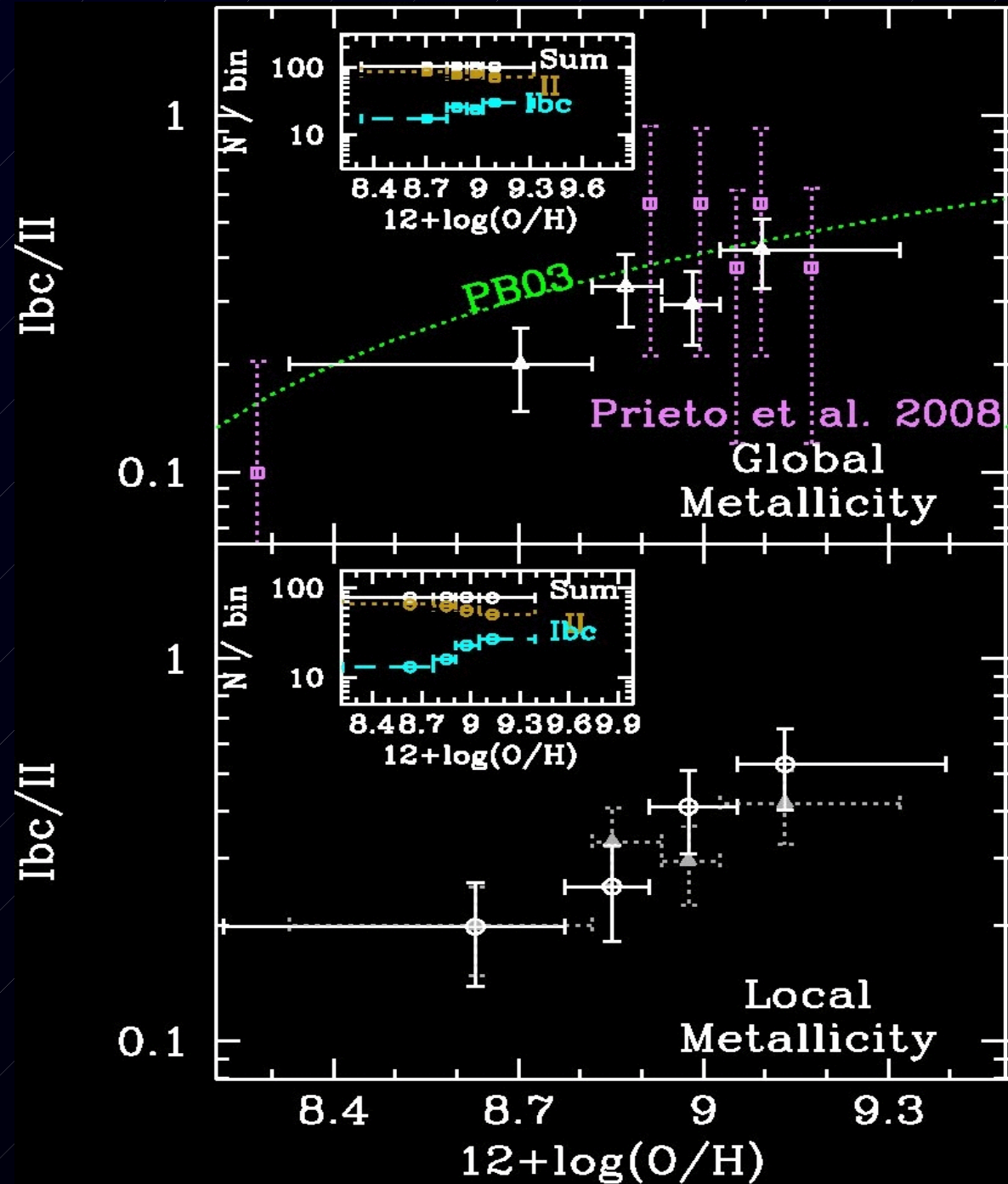


Ibc/II

increases with :

- “global” metallicity (in agreement with PB03, Prieto et al. 2008)

- also “local” metallicity

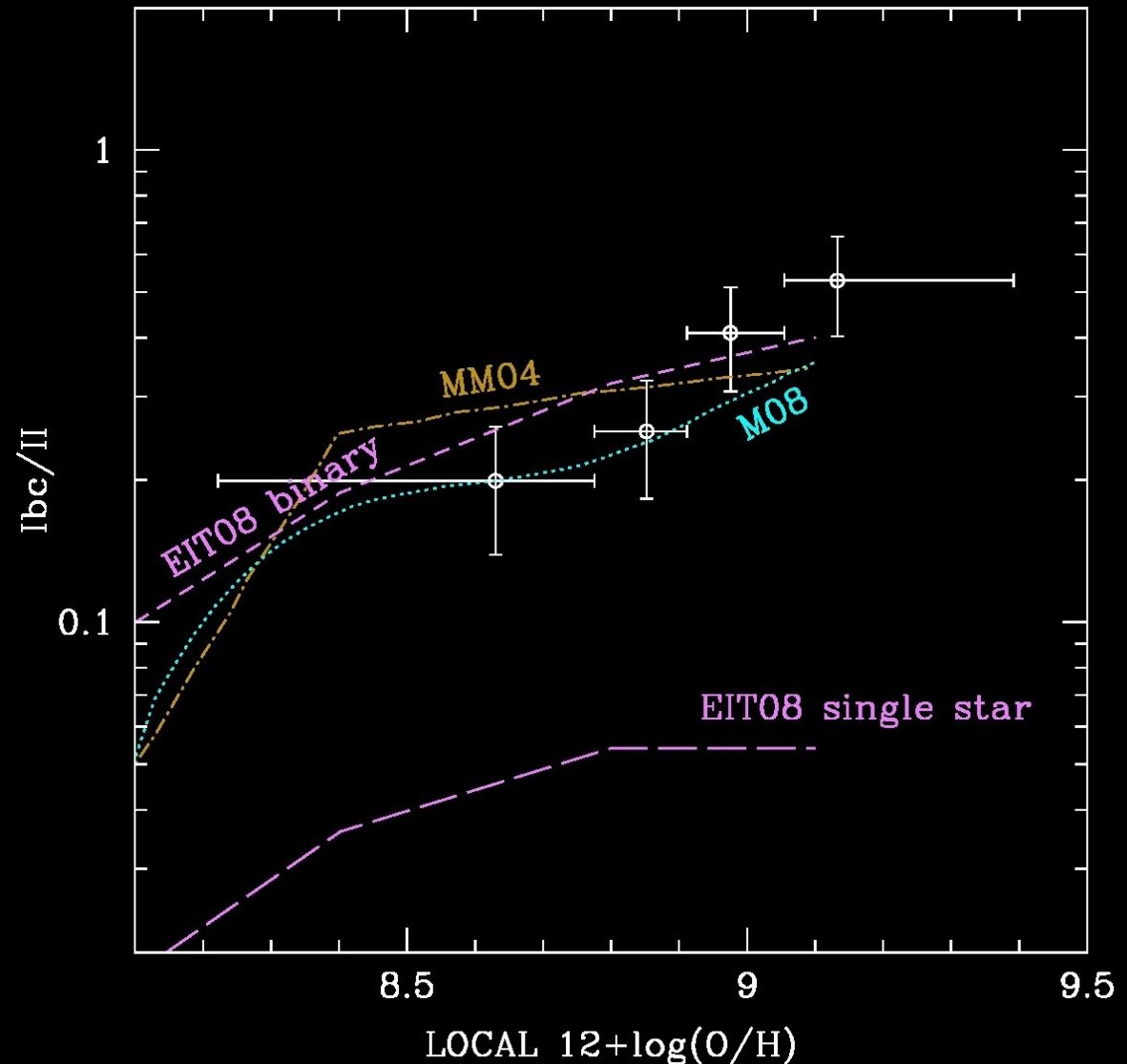


Comparison to models

Eldridge, Izzard, Tout, 2008:
binary models

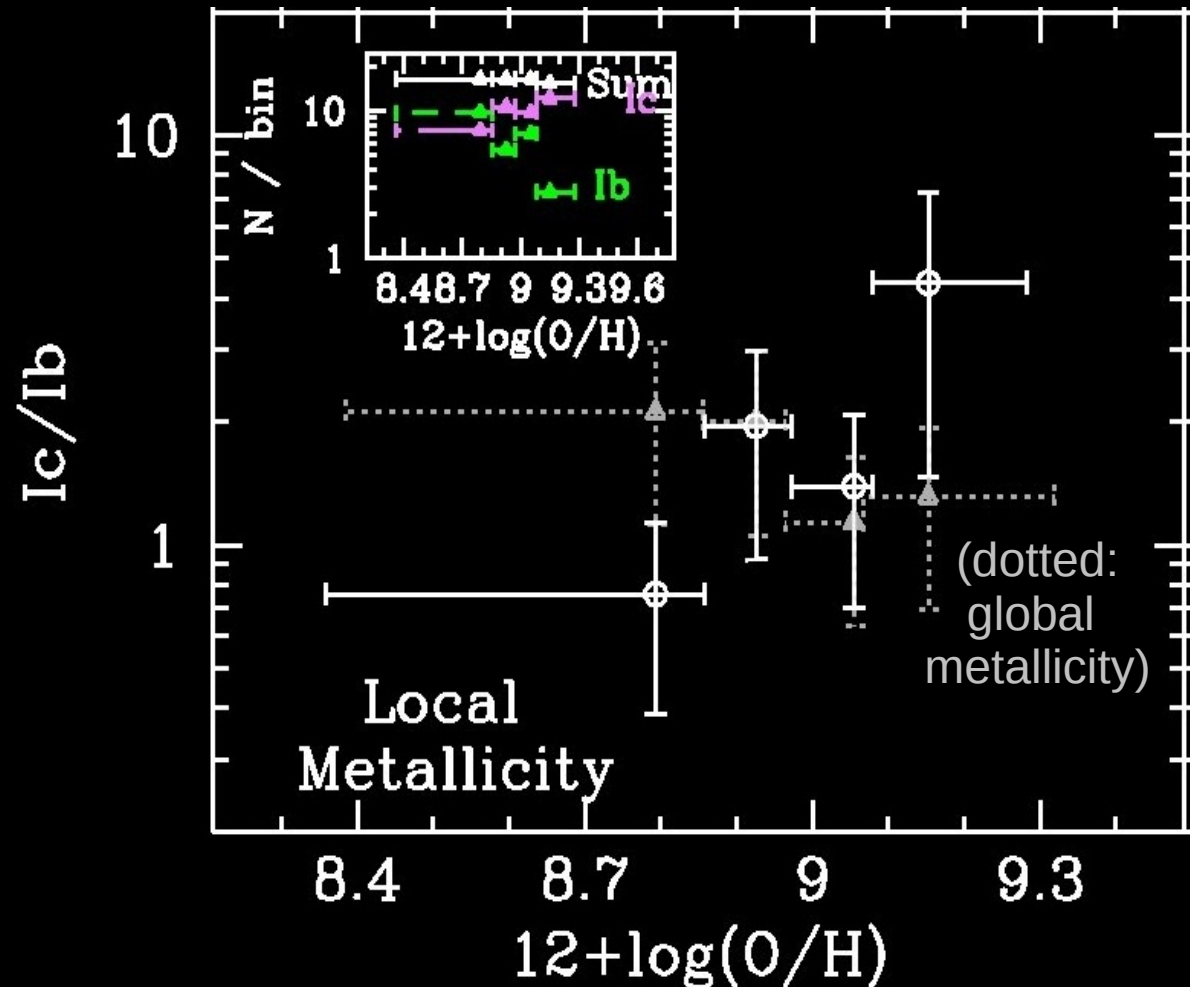
Maeder & Meynet 2004 ;

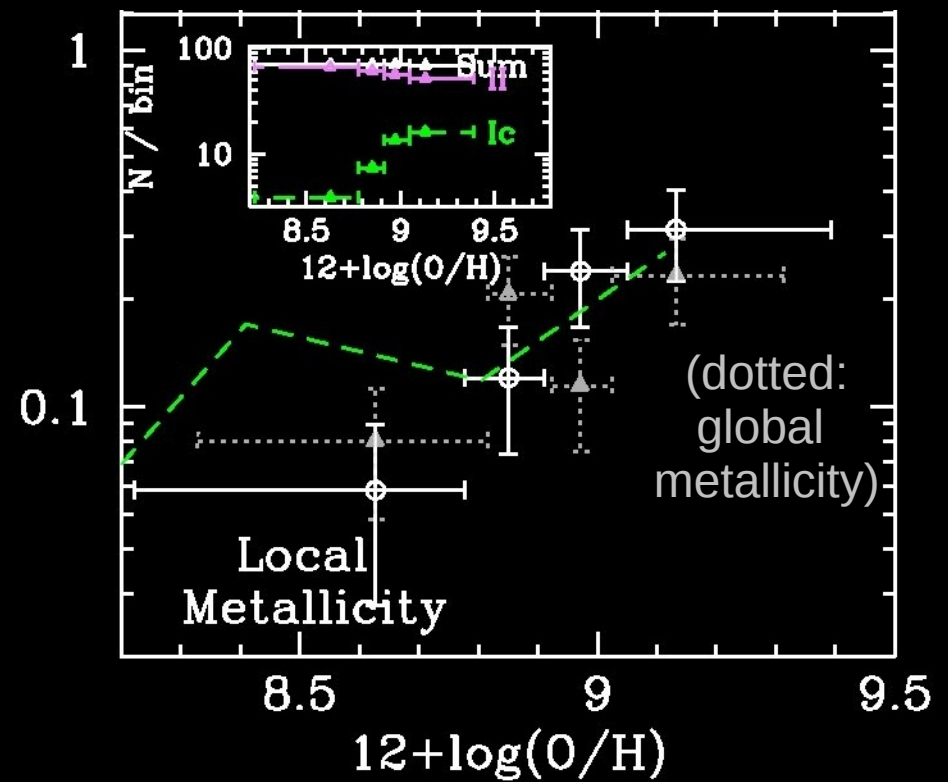
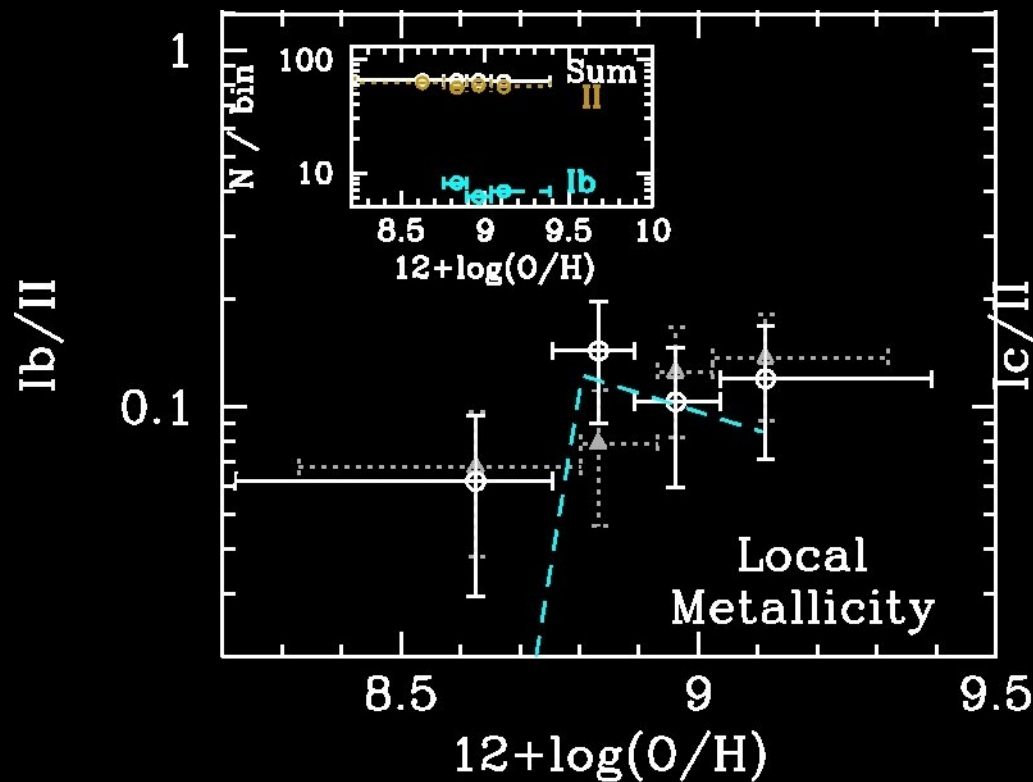
Meynet et al. 2008 :
single star models
with rotation



Ic/Ib

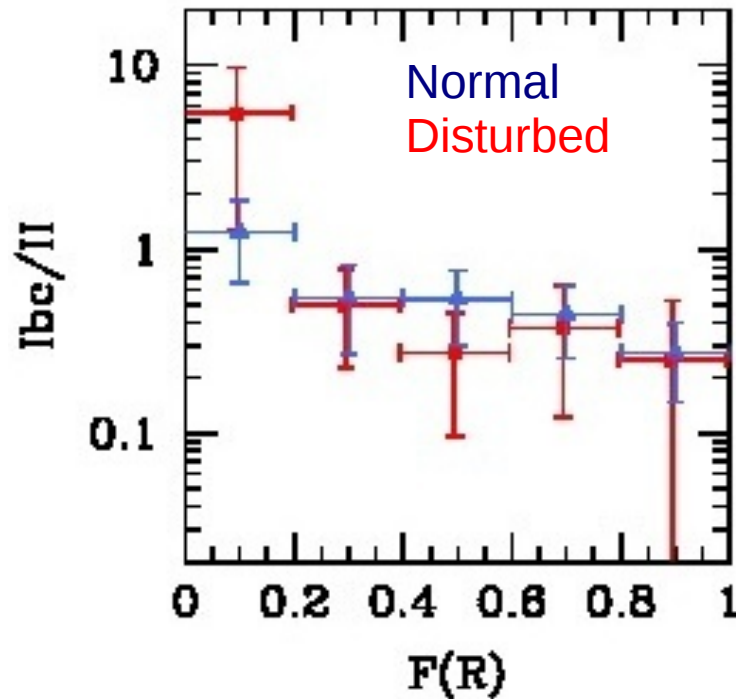
unclear situation:
global and local
relation disagree +
large error-bars :
too low statistics.





Ib/II and Ic/II :

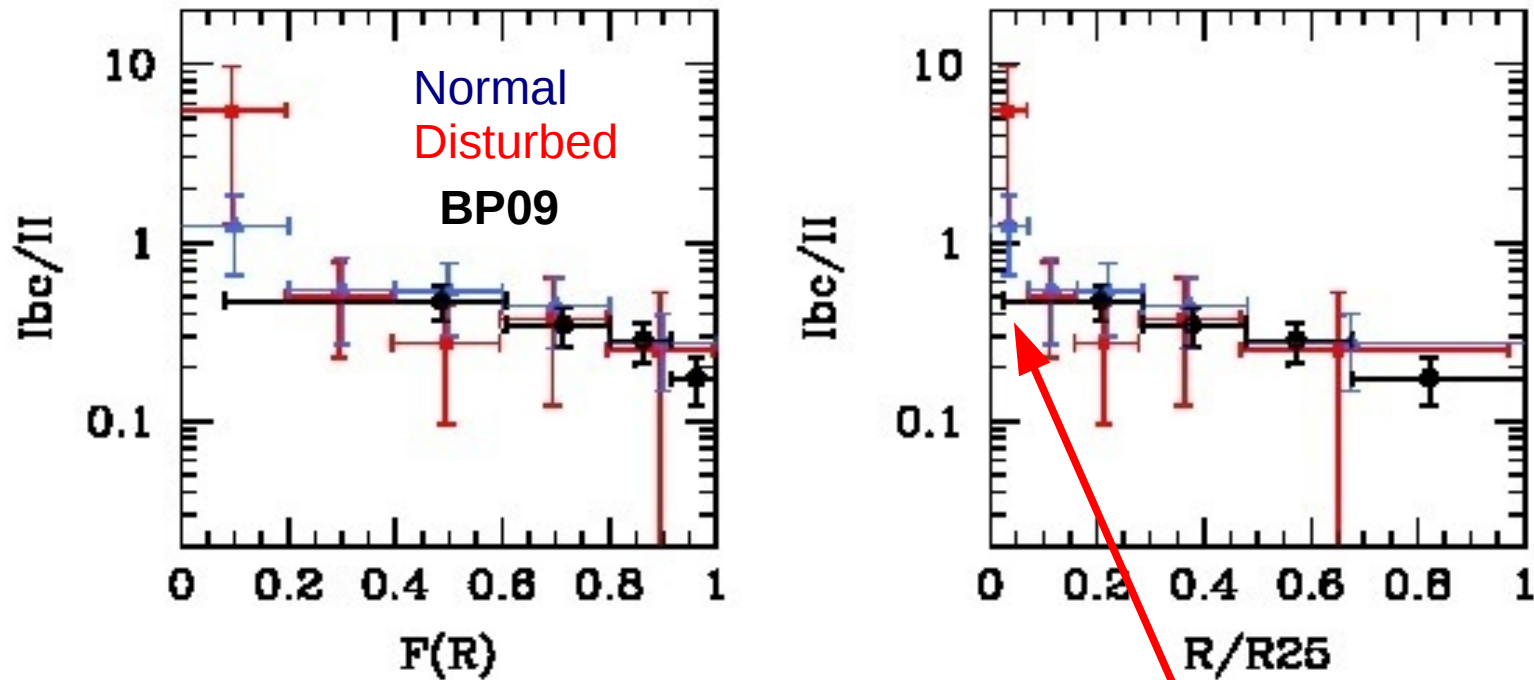
- Ib/II and Ic/II : comparison to single star models of Georgy et al. (2009)



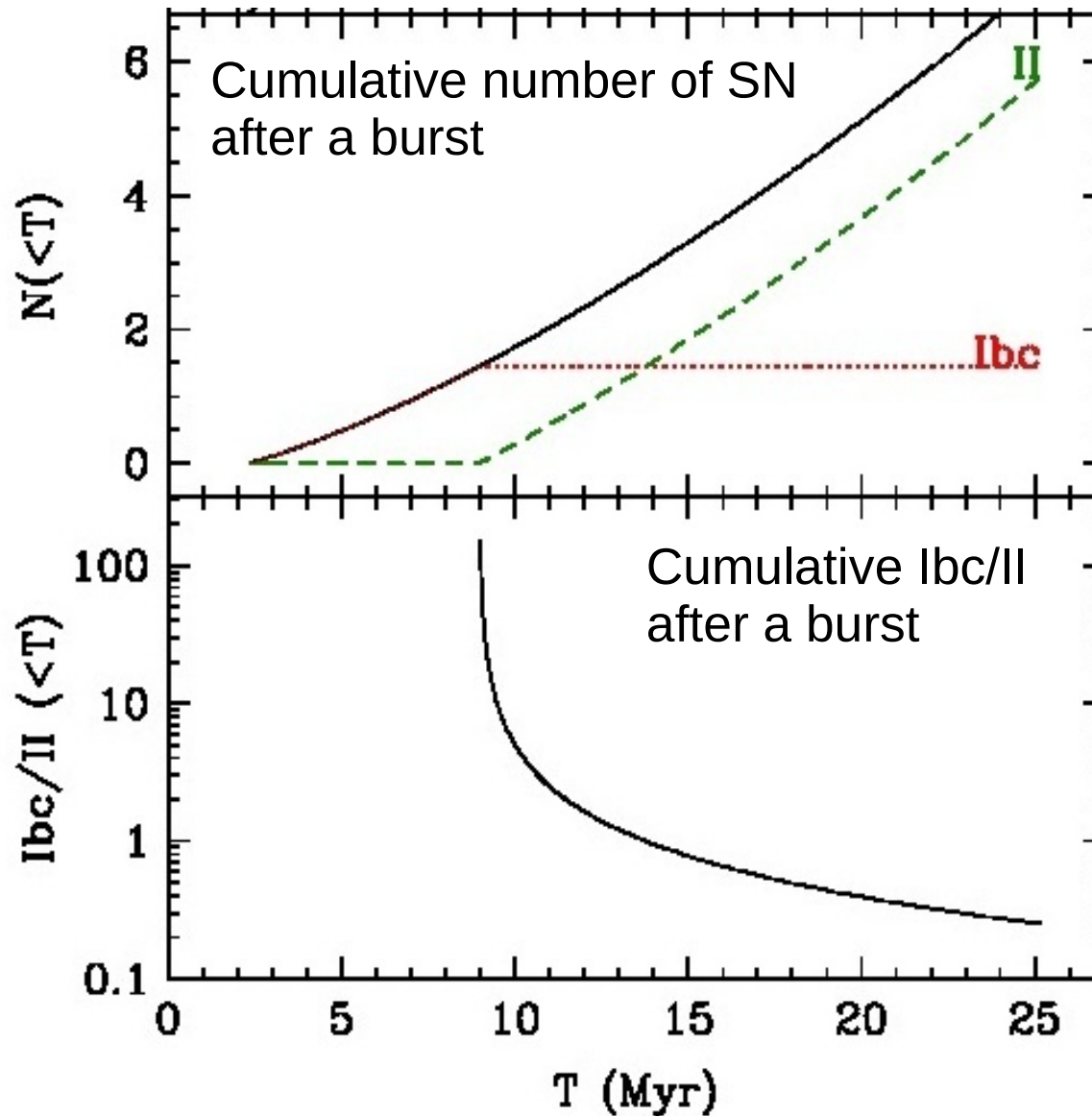
Habergham et al. 2010:
Central excess of Ibc,
especially in disturbed
galaxies.

Related to IMF, not
metallicity

For an exponential disk
with standard central
surf. brightness
(Freeman value),
F(R) can be related to
R/R25



The excess in disturbed galaxy is **very central**. In the rest of the disk, the results are consistent with Habergham et al. 2010

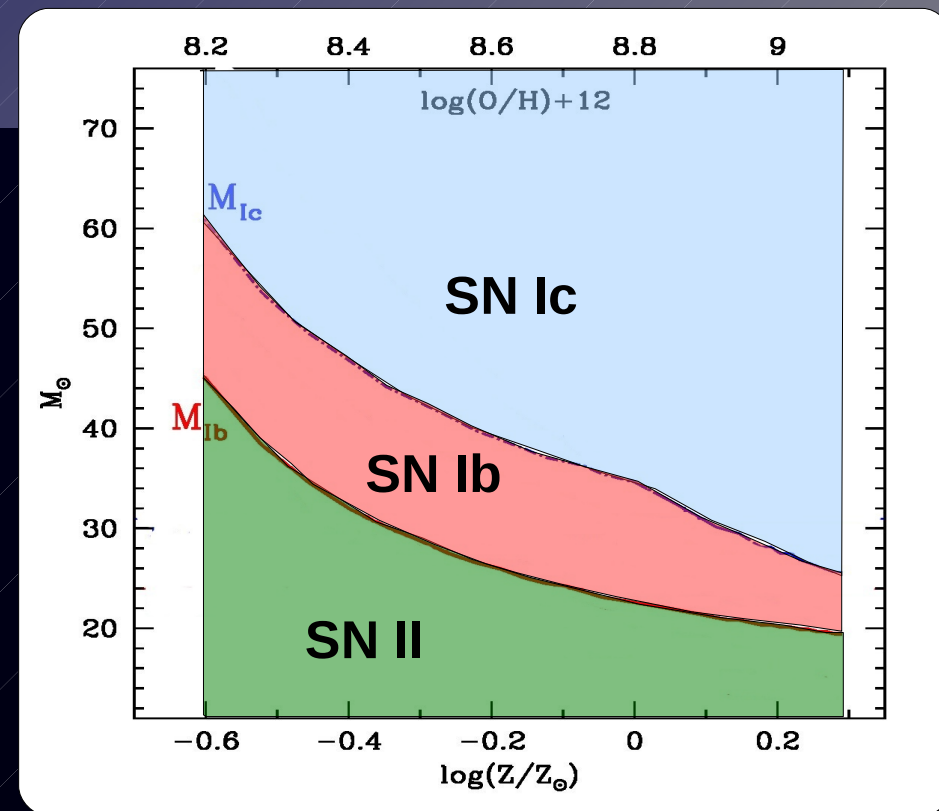


Warning : Star Formation history may affect the Ibc/II ratio

Conclusion, perspectives

Summary:

Large numbers of SN allow to derive **Mlb** and **Mlc** dependence on **metallicity**, constraining models, but other possible effects (temporal, IMF)



Perspectives:

- Mass function of GRBs hosts (at various redshifts) should allow to derive the **GRB/CC** dependence on **metallicity**.

- Prantzos & Boissier, 2015 :
enough statistic to properly determine Ib/Ic

