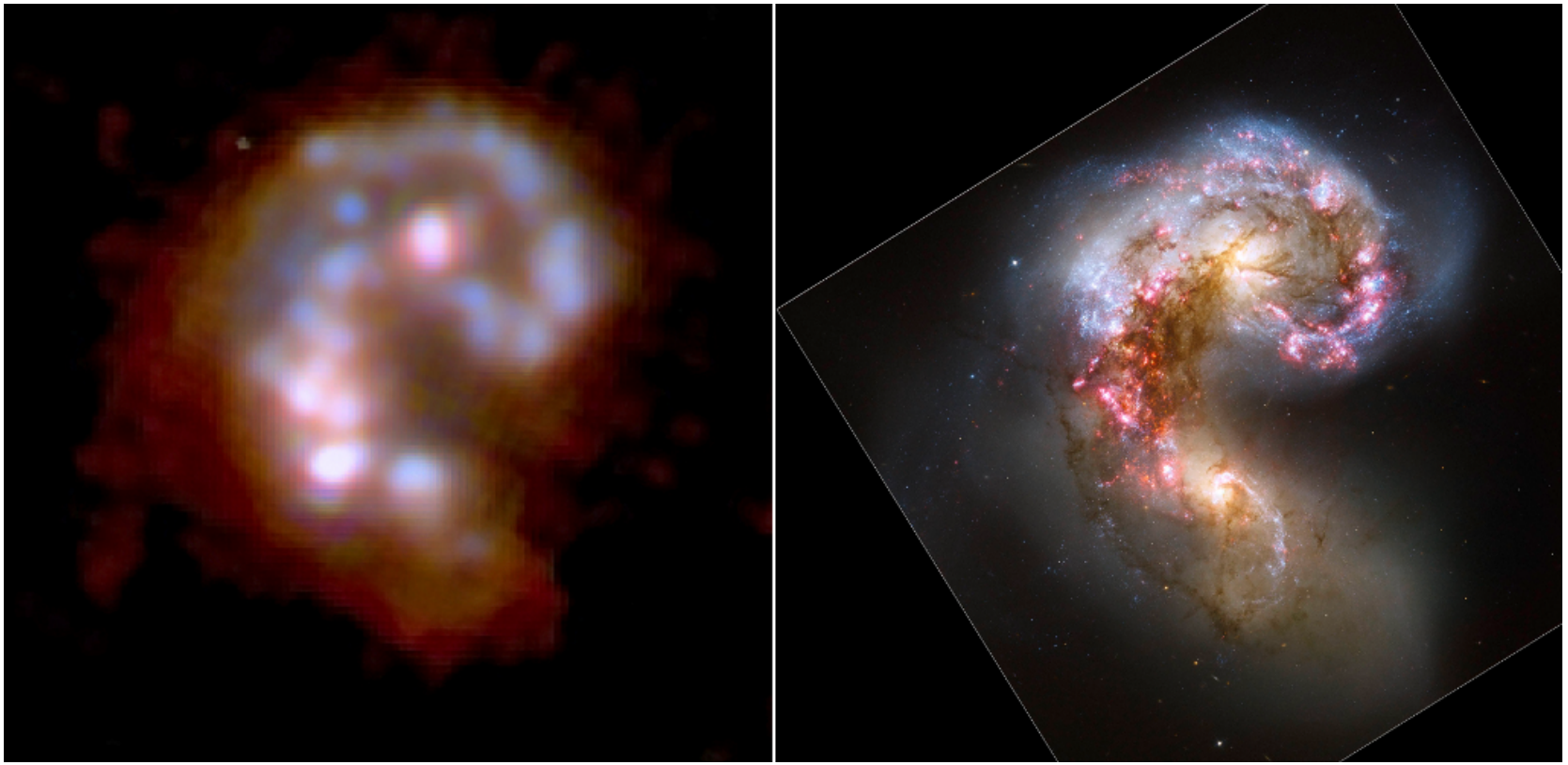
Obscured galaxies

- Metallicity is often unknown
- When observed, refers to the outskirt only

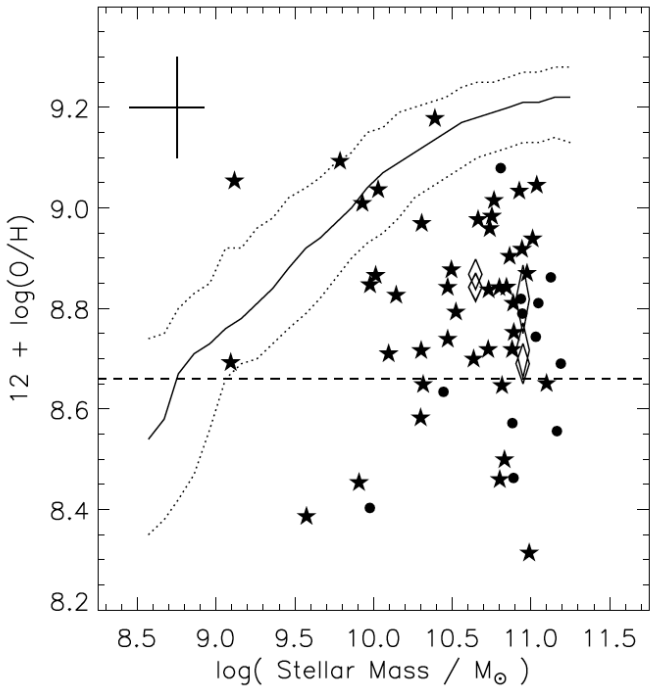


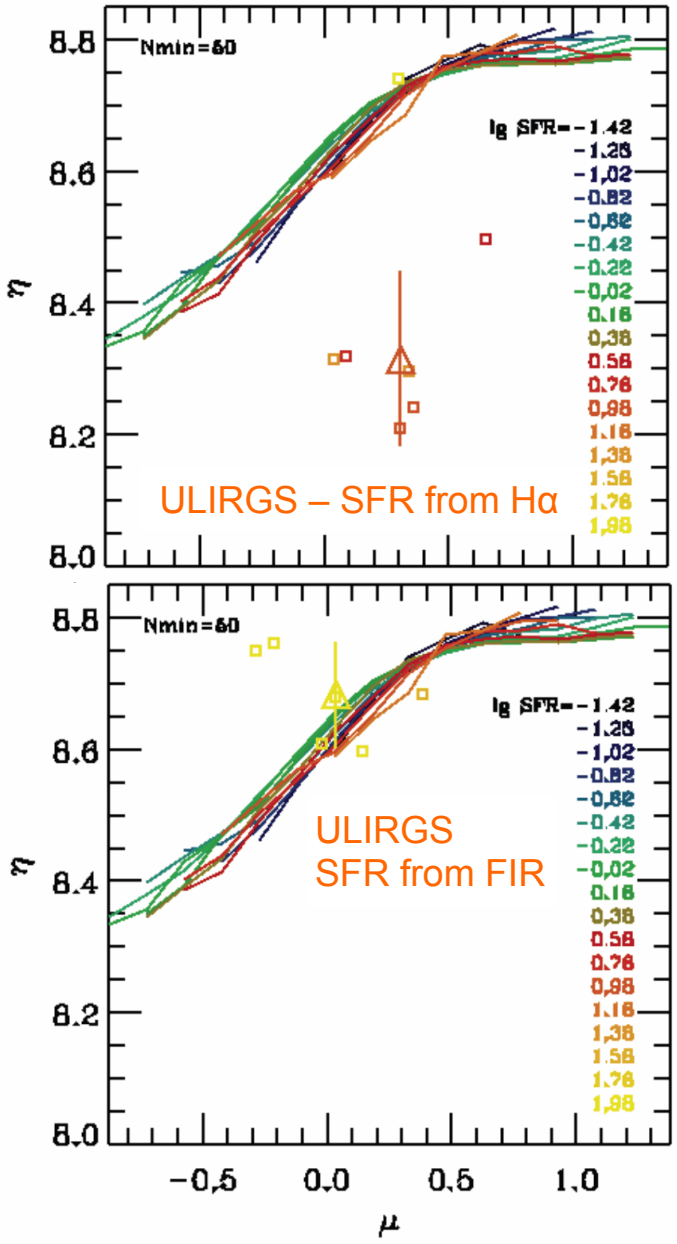
ESA / PACS / SHINING / U. Klaas & M. Nielbock, MPIA.

Obscured galaxies

- Do ULIRG follow the same relations?

Rupke et al. 2008





Maiolino+ in prep.

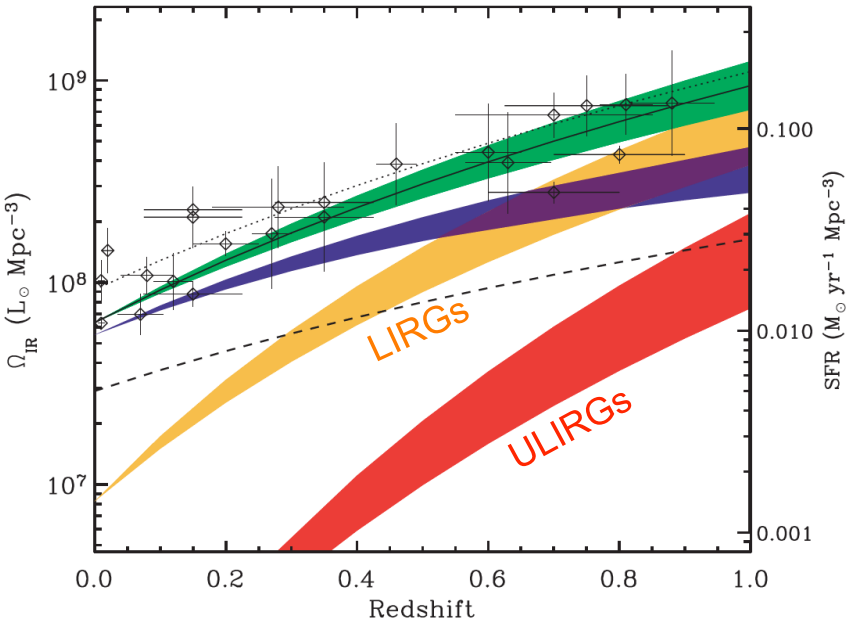
Different processes?

Same processes?

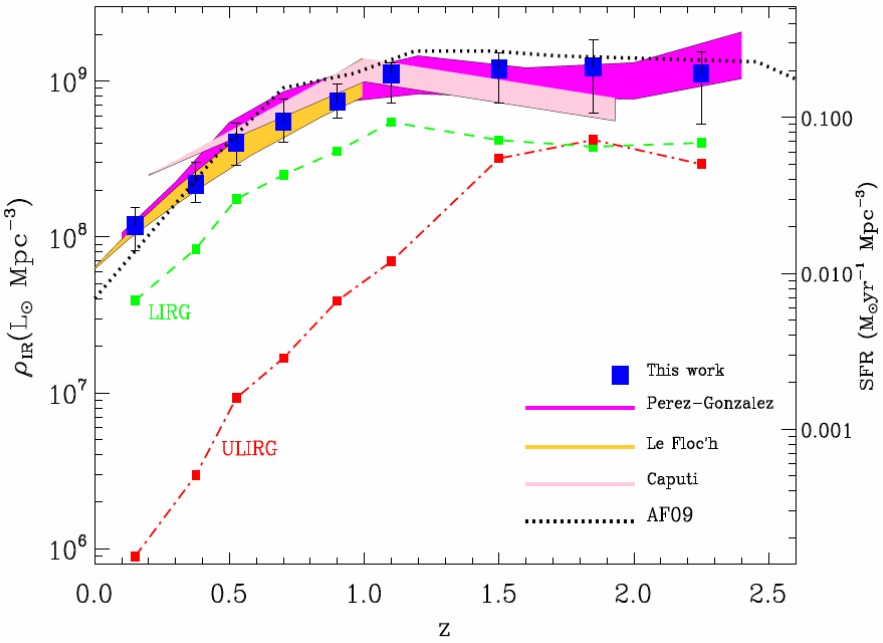
SPICA: both SFR and metallicity from FIR

Obscured galaxies

The fraction of obscured star formation increases with redshift



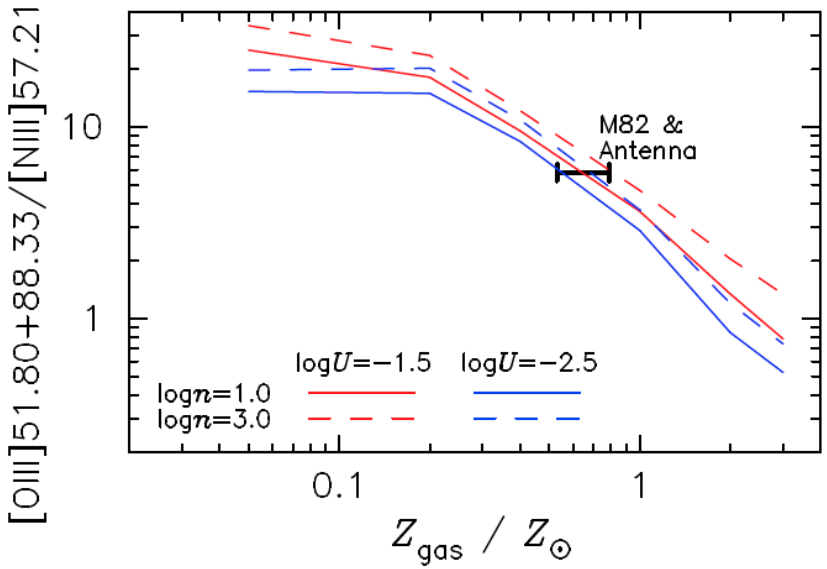
Le Floch et al 2005



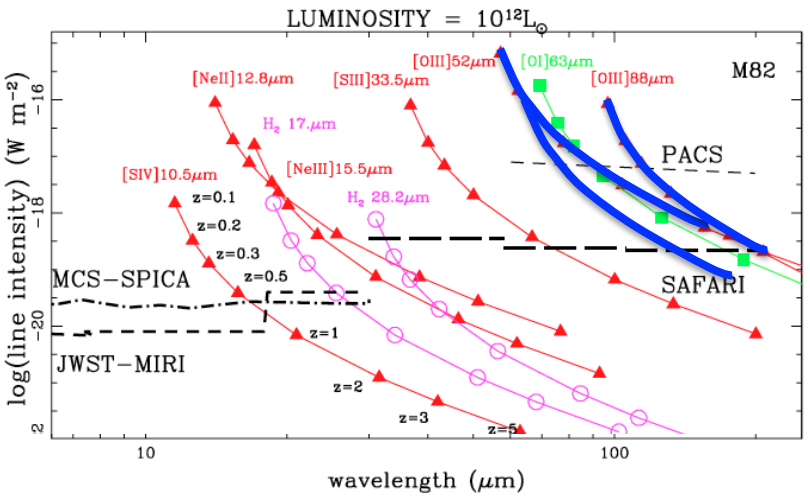
Rodighiero et al 2011

Longer wavelengths

- Extinction-free lines $\dfrac{\text{[OIII]52+88μm}}{\text{[NIII]57μm}}$ Nagao+10



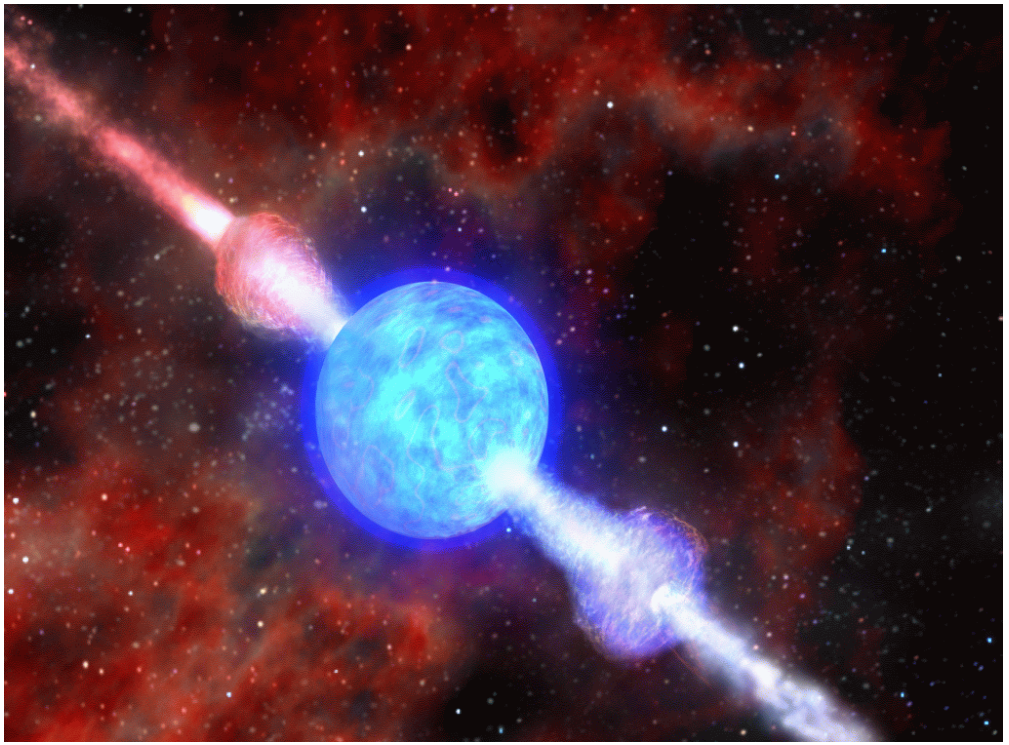
Nagao+11



Spinoglio+12

~0.5-2 galaxies/field (1h) Spinoglio+12

Nature of GRBs



Long-GRBs are due to the explosion of young, massive stars.

Progenitors are not well understood

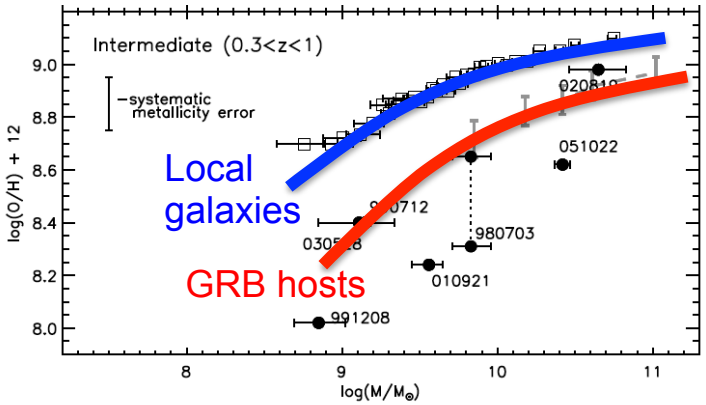
- Do they trace SFR? Or do they depend on metallicity?
- Can GRBs be used to study the cosmic SFR?

Metallicity and GRBs

Does the GRB production depend on metallicity?

YES!

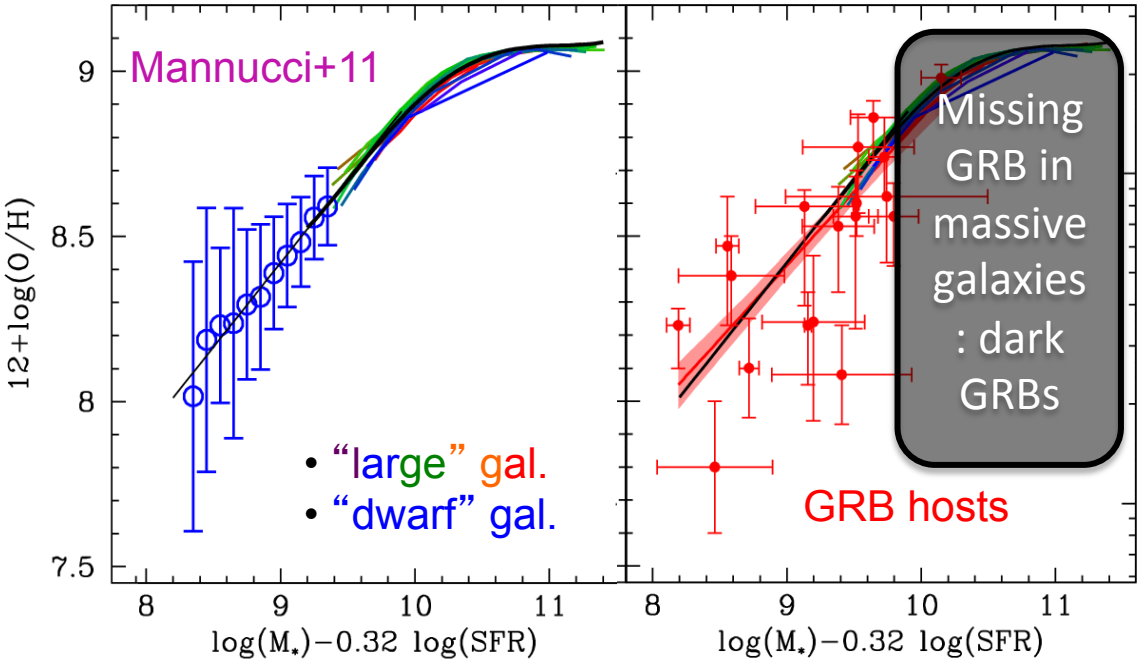
- LGRB rate does not follow SN II rate Fruchter+06; Wainwright +07
- Few LGRBs in LIRGs, ULIRGs and SMGs Berger+03; Tanvir+04, Le Floch+06
- Host below the mass-metallicity relation Stanek+06; Modjaz+08, Levesque+10



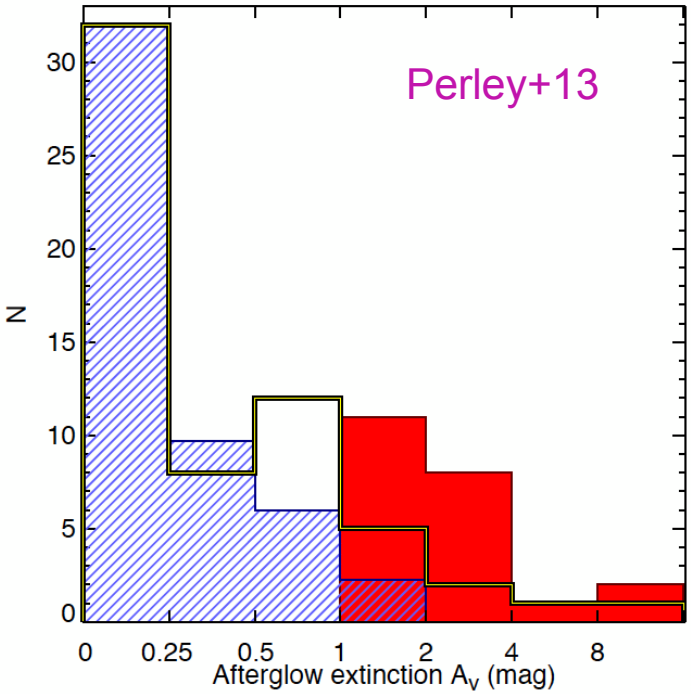
Levesque+10

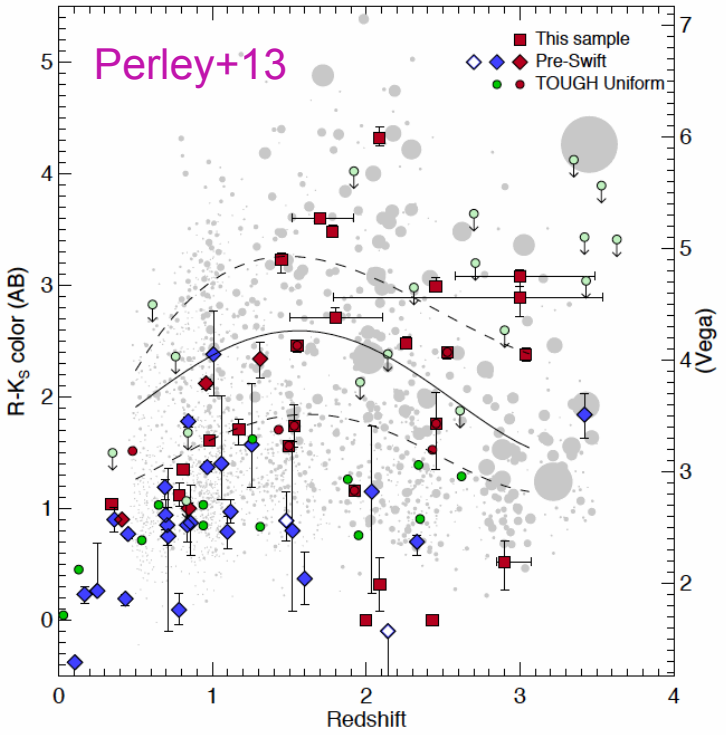
NO!

- Same mass-metallicity relation Savaglio+09
- Metallicity as expected from the FMR Mannucci+11; Kocevski+11



Metallicity and dark GRBs



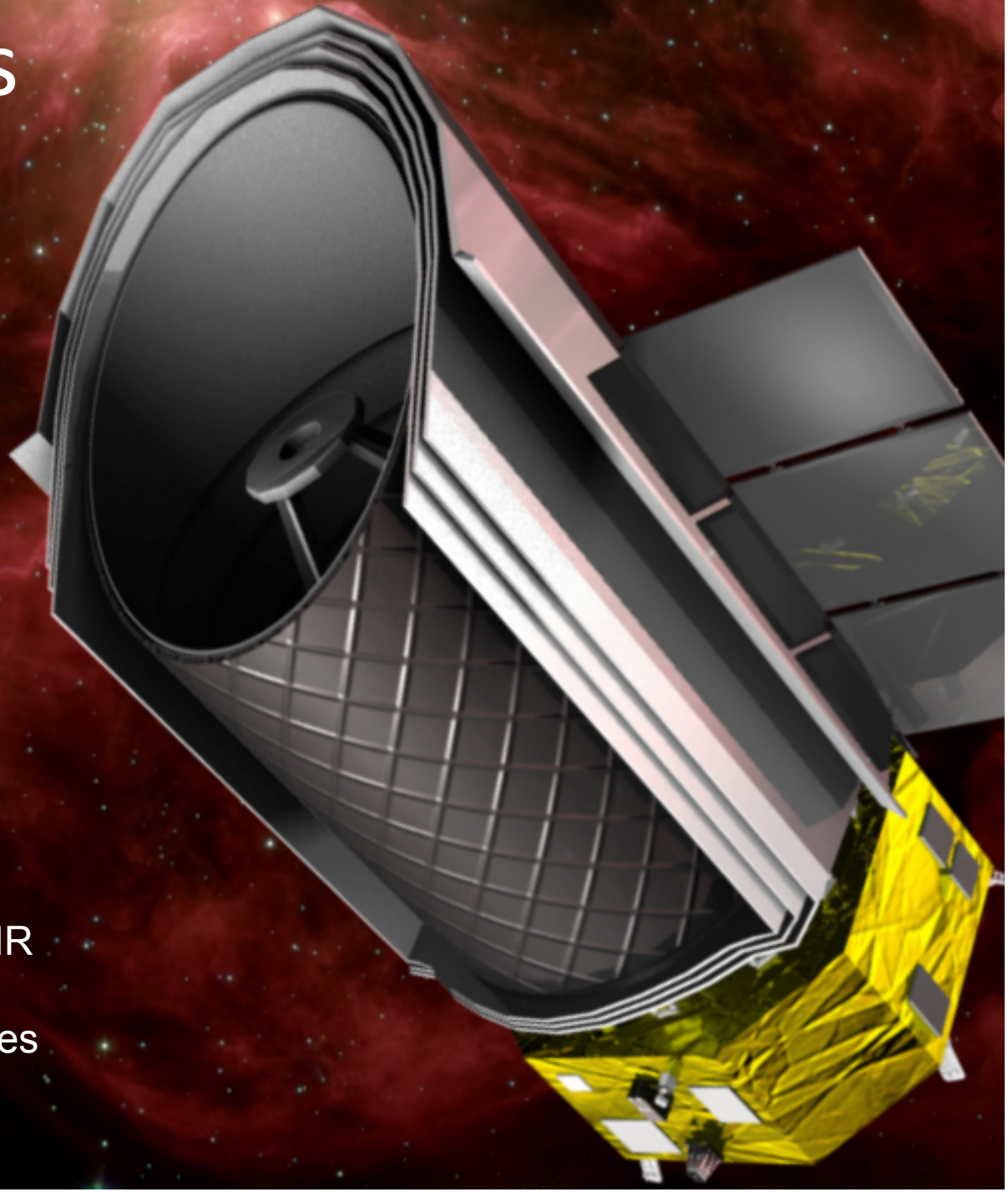


"Dark" GRB:

- Observed afterglow extinctions up to A_V>9
- Very red host galaxies (R-K<=6)
- "Optical" metallicity probably biased

- SPICA metallicities are requested

Conclusions



- Many projects require to measure metallicity in very dusty environments
- This can be done by using extinction-free lines in the FIR
- SPICA will allow these studies