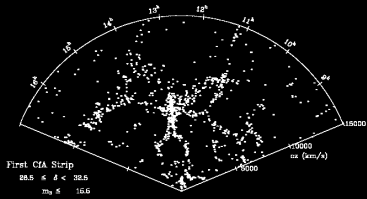
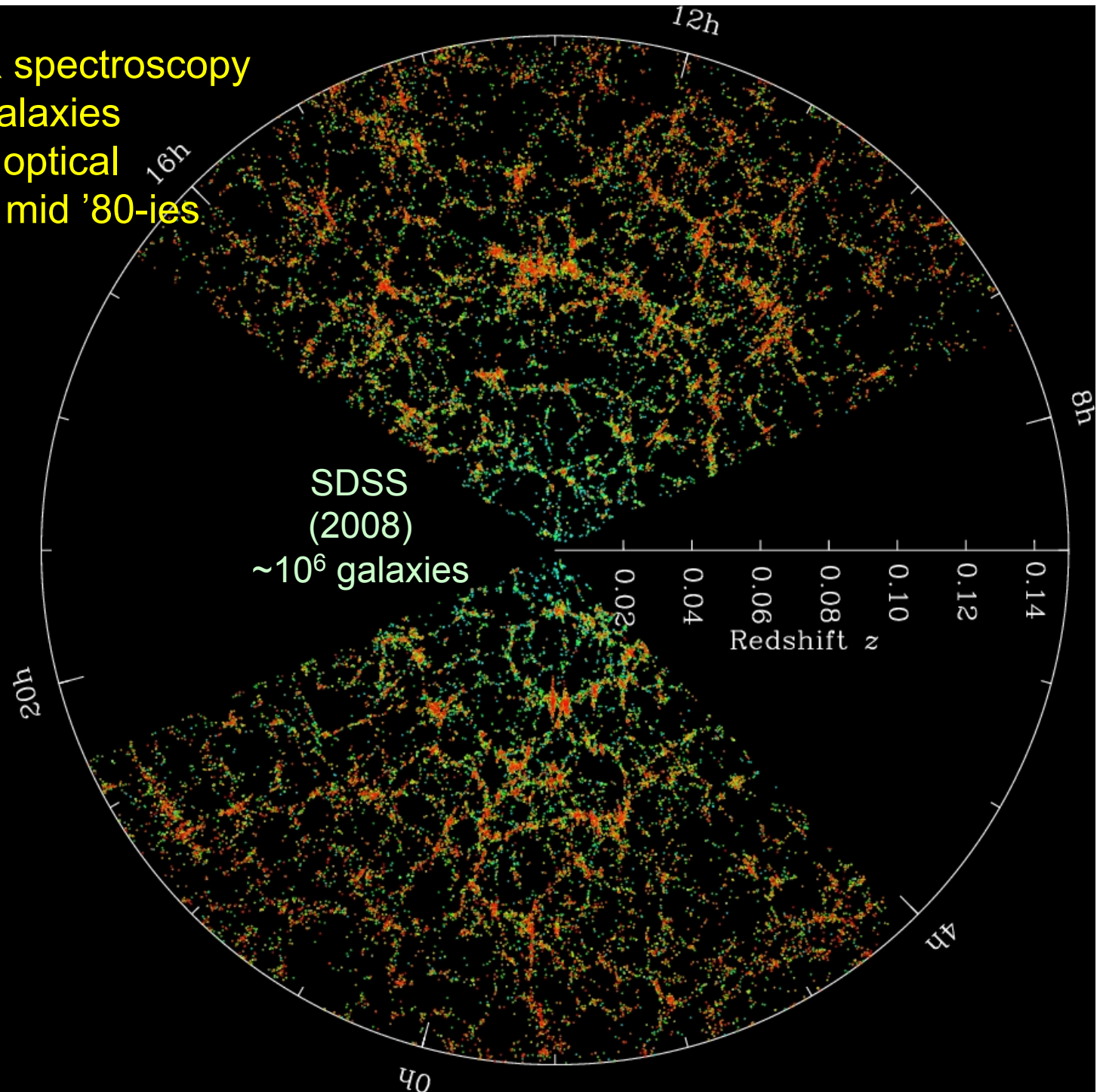


currently mid/far-IR spectroscopy
~100-200 galaxies
worse than optical
spectroscopy in mid '80-ies

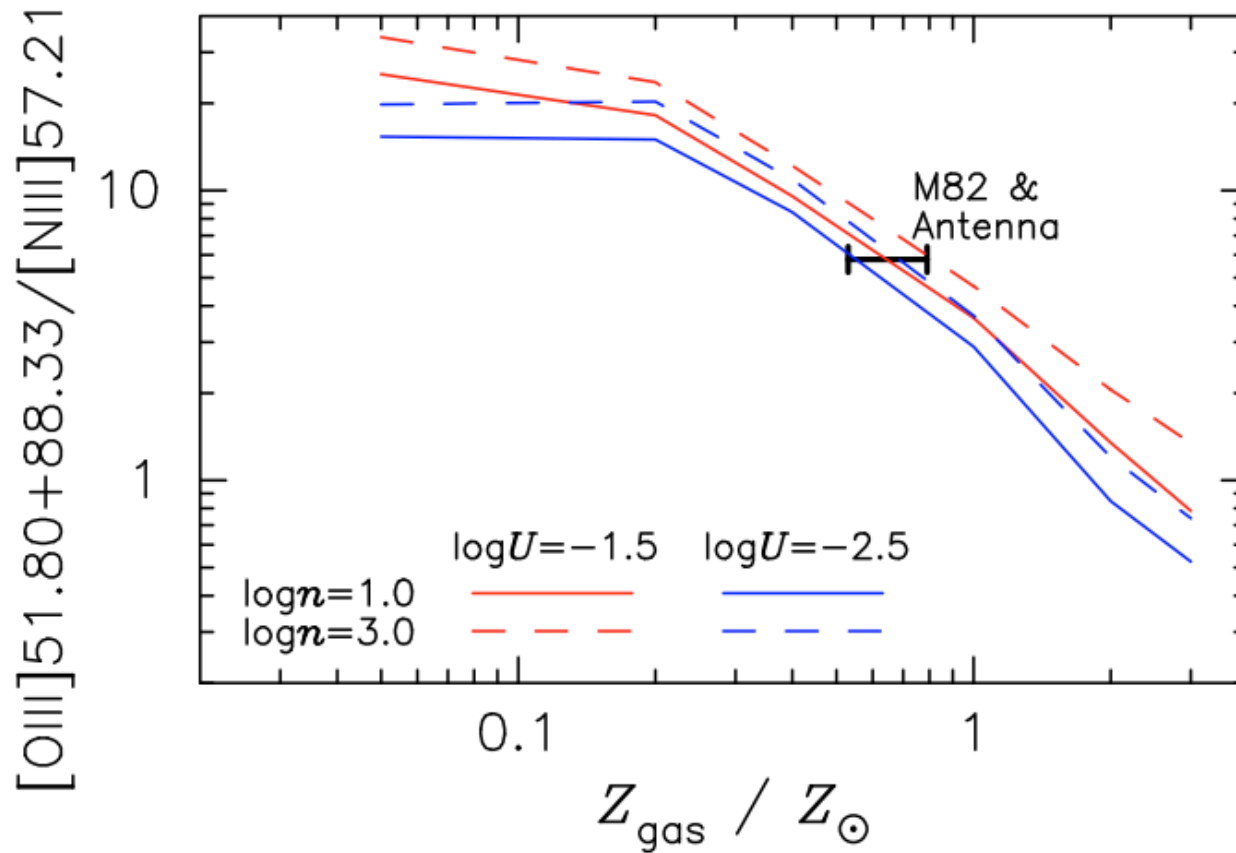


CfA first slice
(1985)
~1000 galaxies



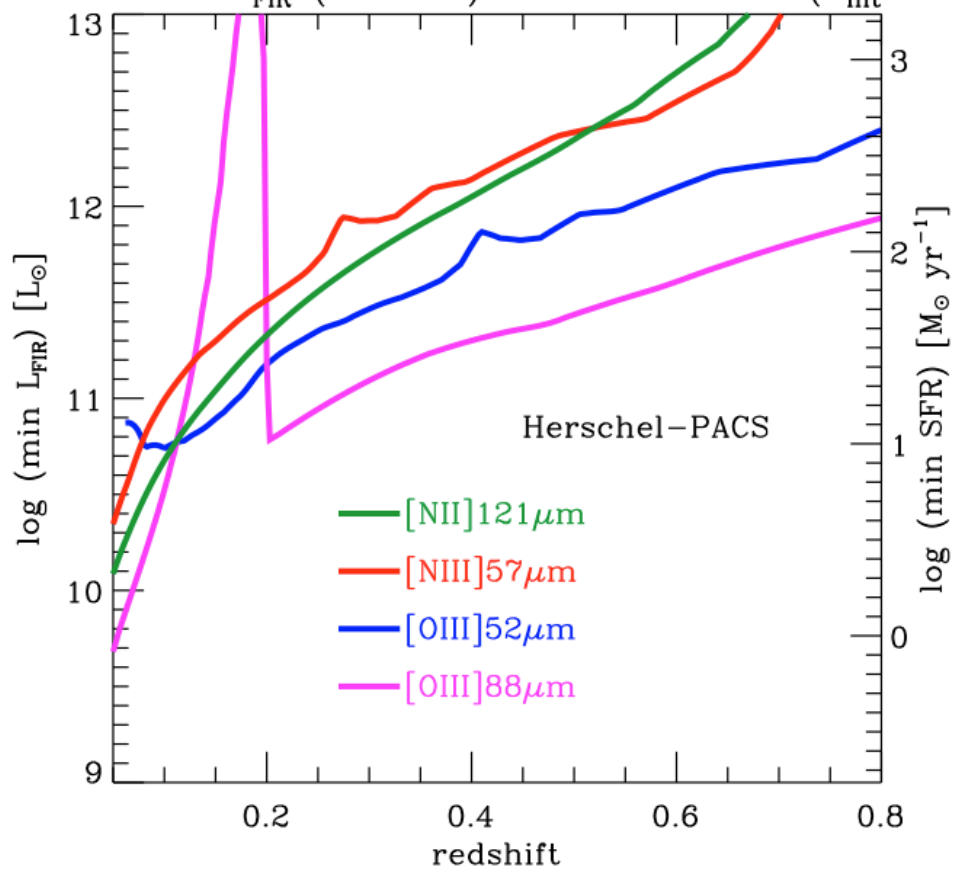
Mid and Far-IR diagnostics

Mid/Far-IR metallicity diagnostics:
exploring the chemical enrichment of
dust embedded star formation



Nagao+11

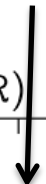
minimum L_{FIR} (or SFR) to achieve 5σ ($T_{\text{int}}=3\text{h}$)



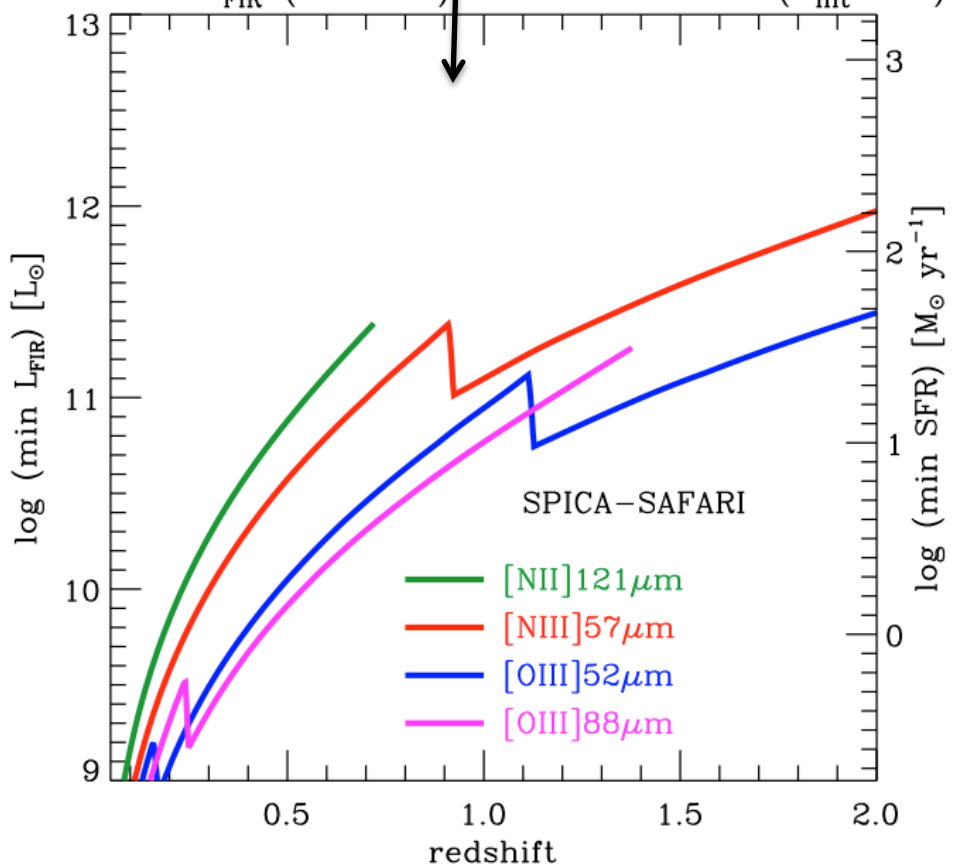
Barely feasible with Herschel for a handful of galaxies



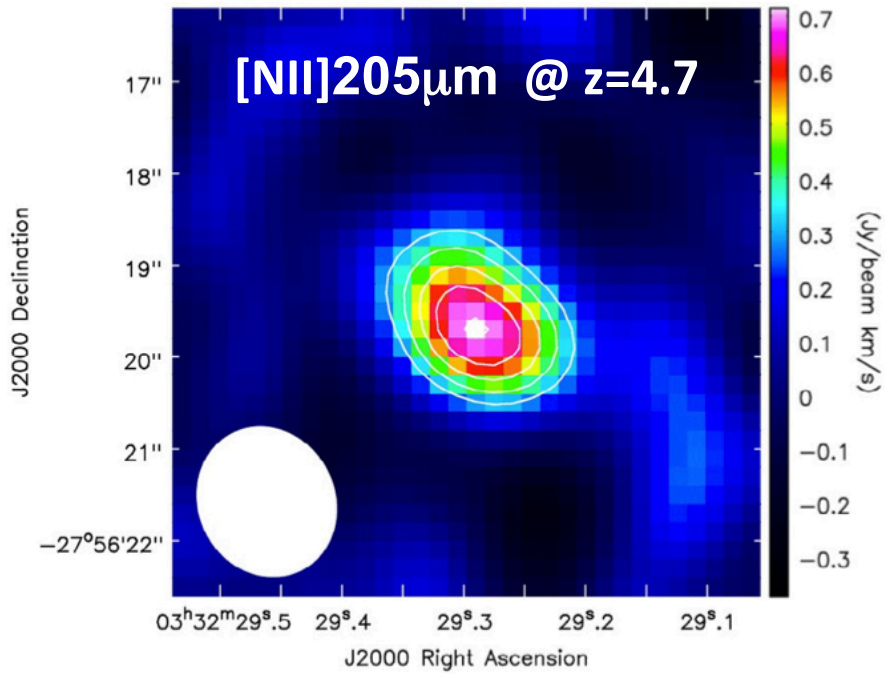
Massive surveys will be feasible with SPICA



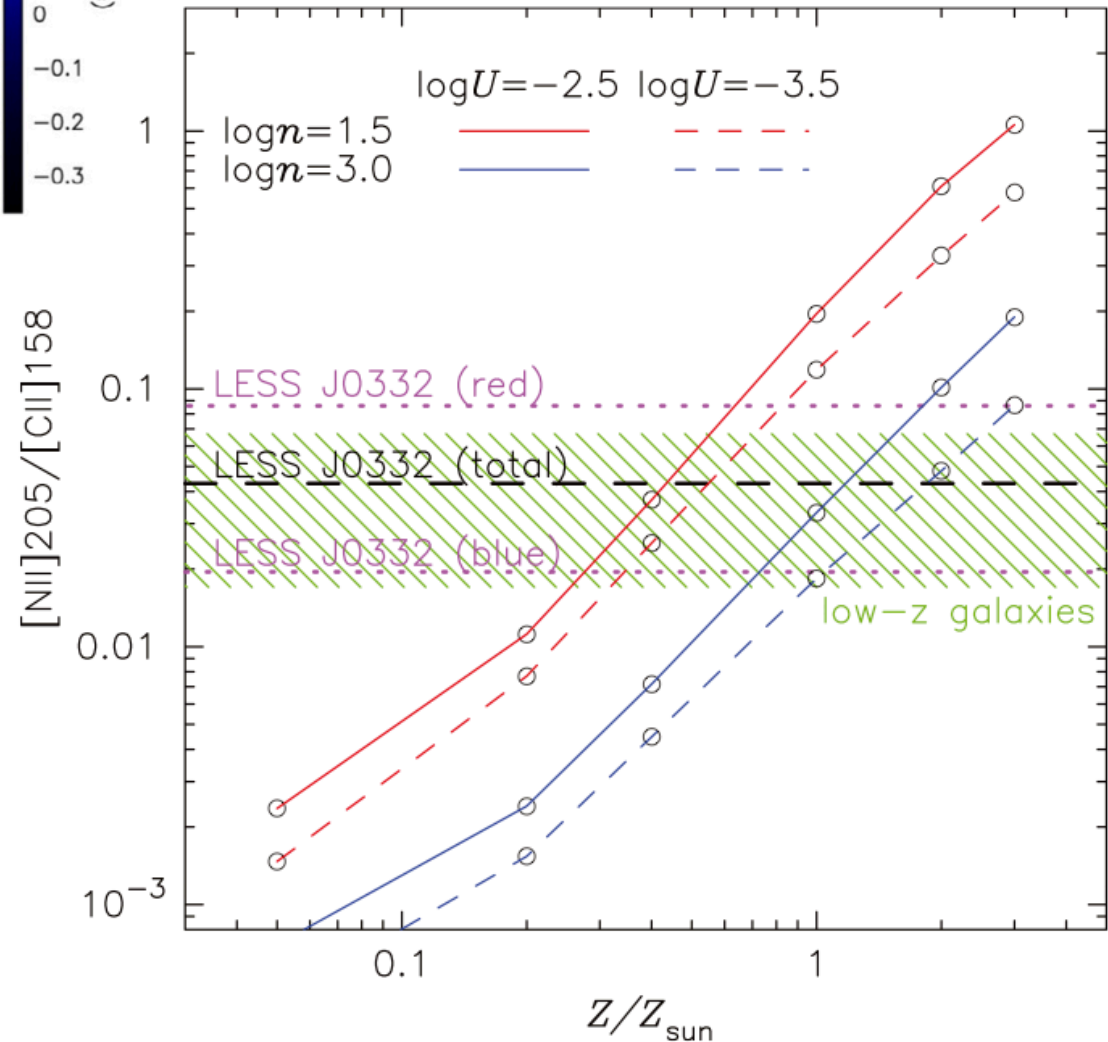
minimum L_{FIR} (or SFR) to achieve 5σ ($T_{\text{int}}=3\text{h}$)



Nagao+11

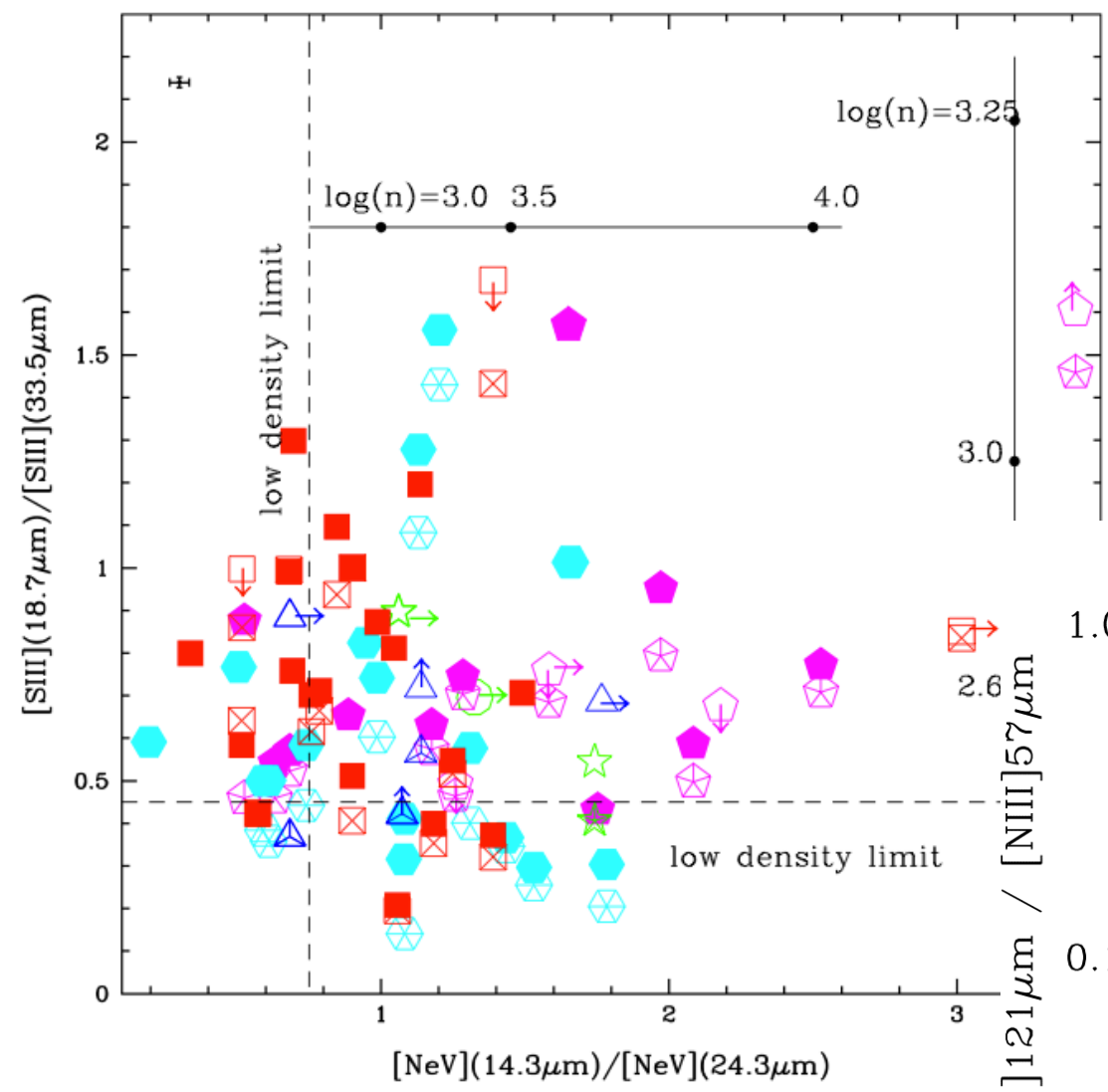


“Heroic” attempts to constrain the metallicity with ALMA, but can only access very high redshift and only 1-2 far-IR lines in good atmospheric windows

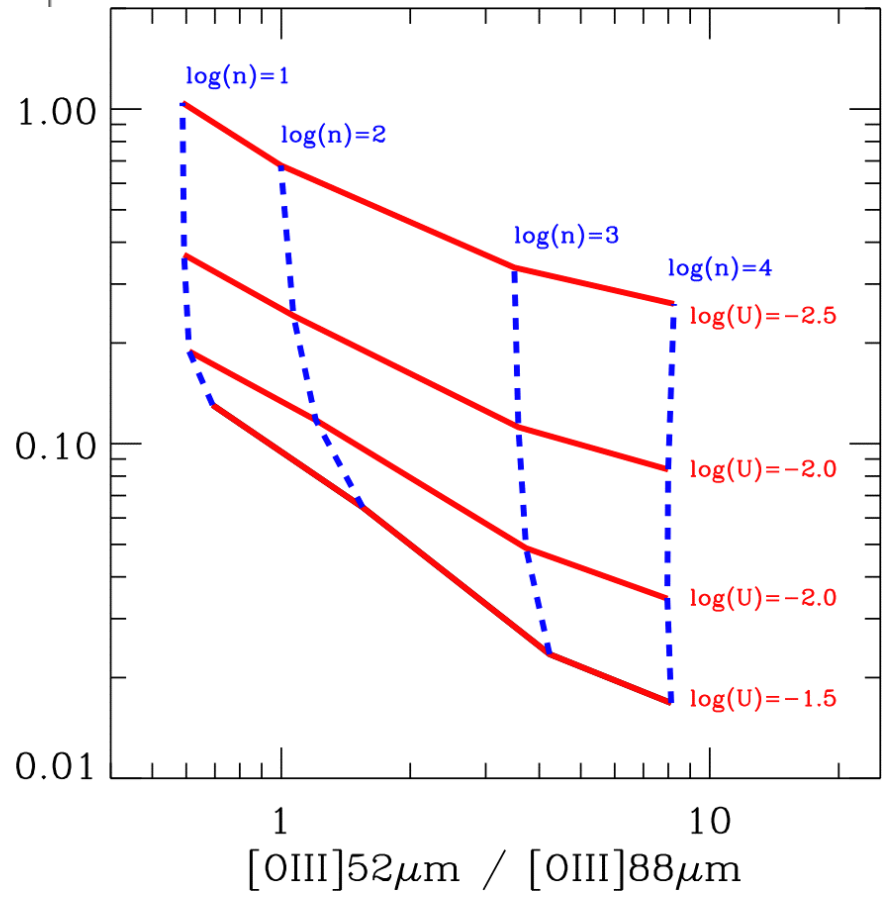


Nagao+12

Gas density and ionization parameter

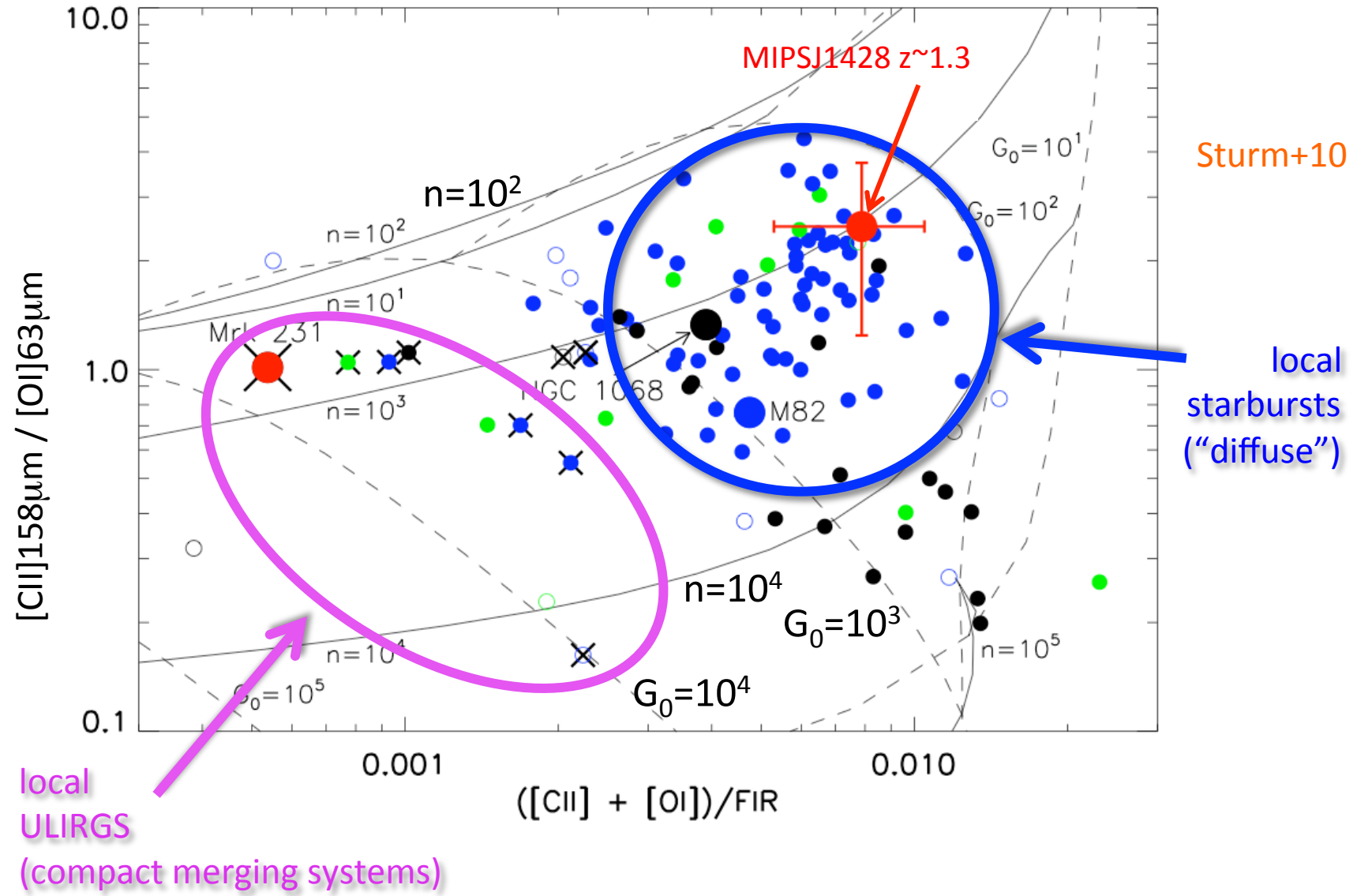


Tommasin+12

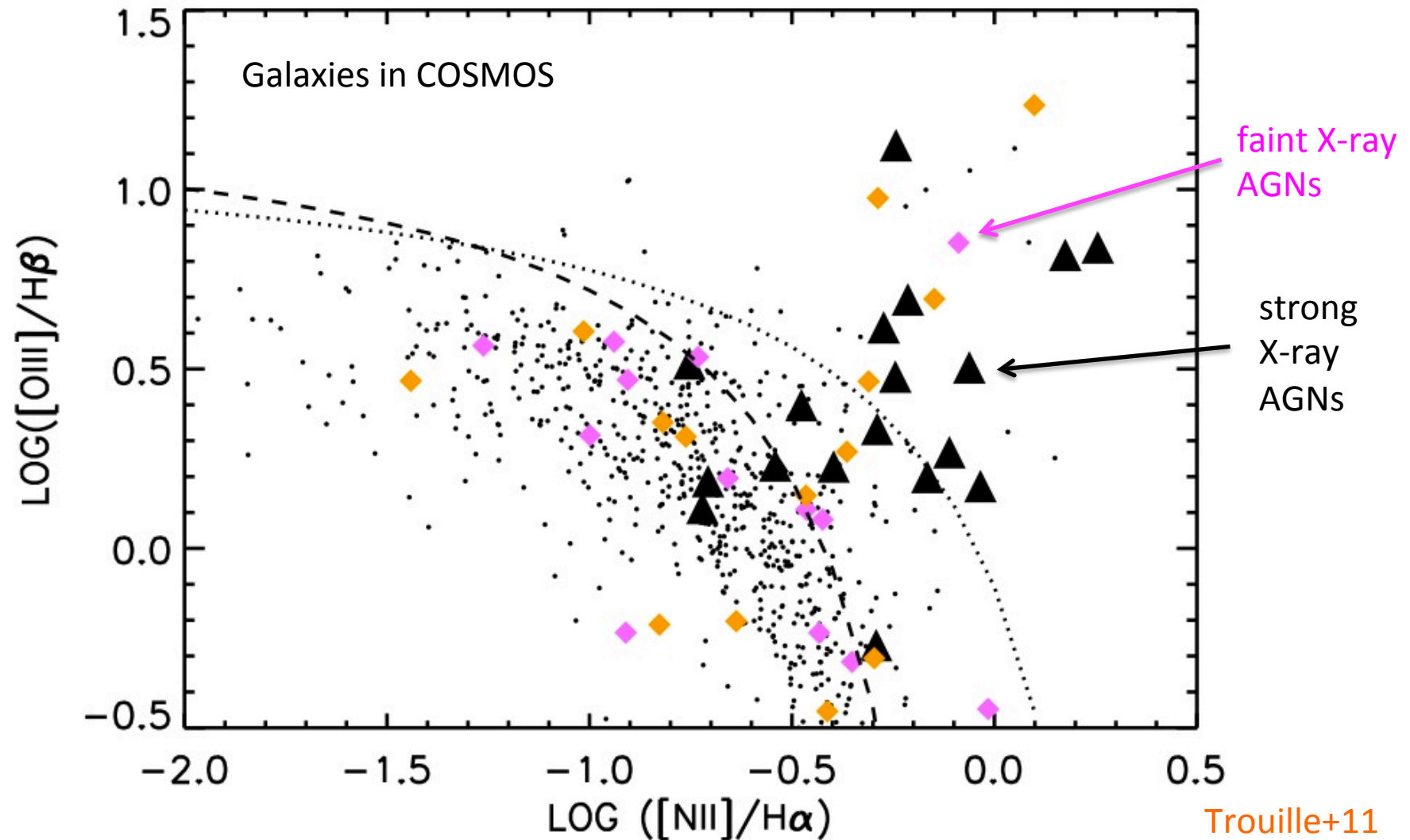


Nagao+11

Tracing density and radiation field with far-IR fine structure lines

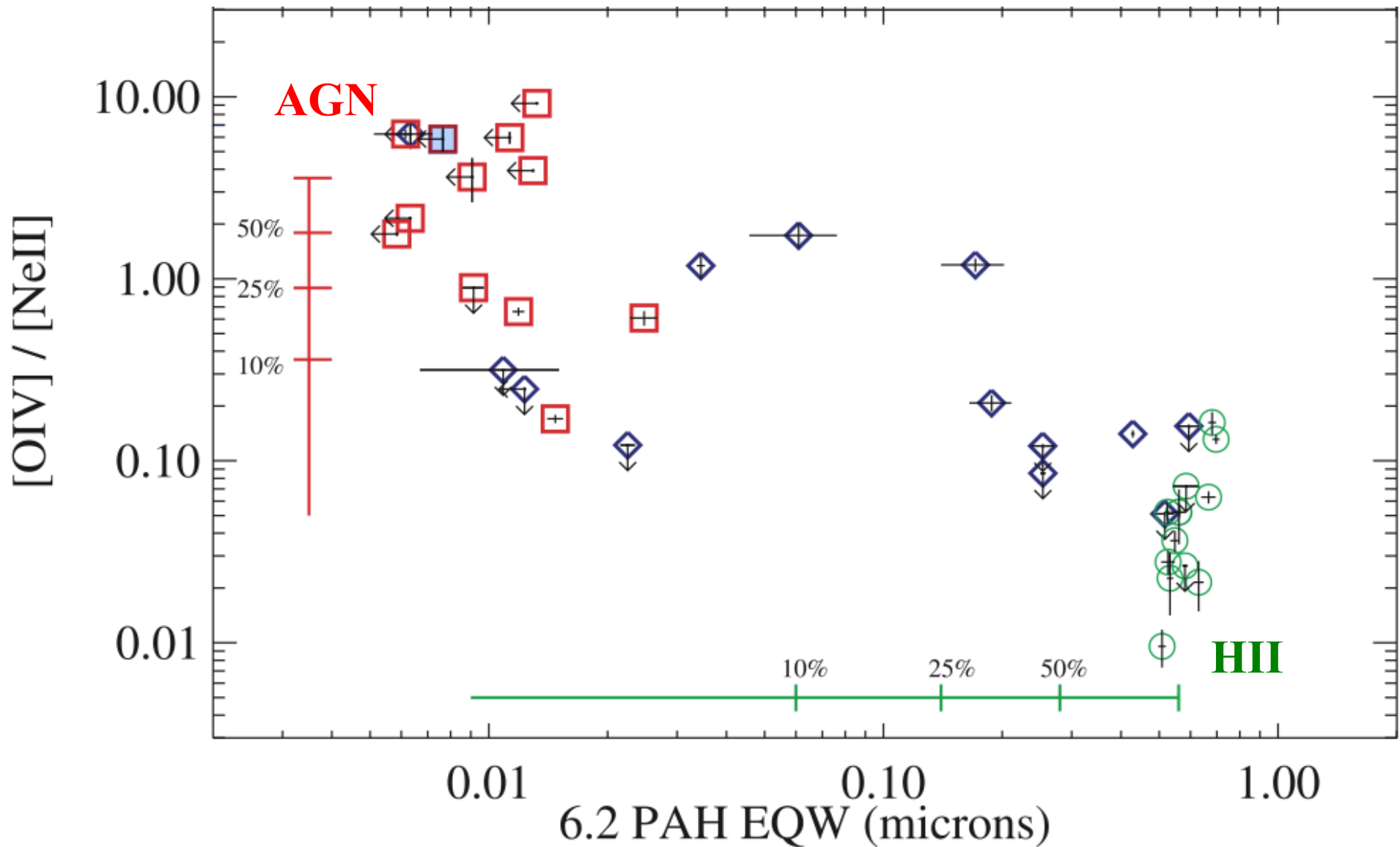


Identification of accreting black holes (AGNs) optical identification deceiving...

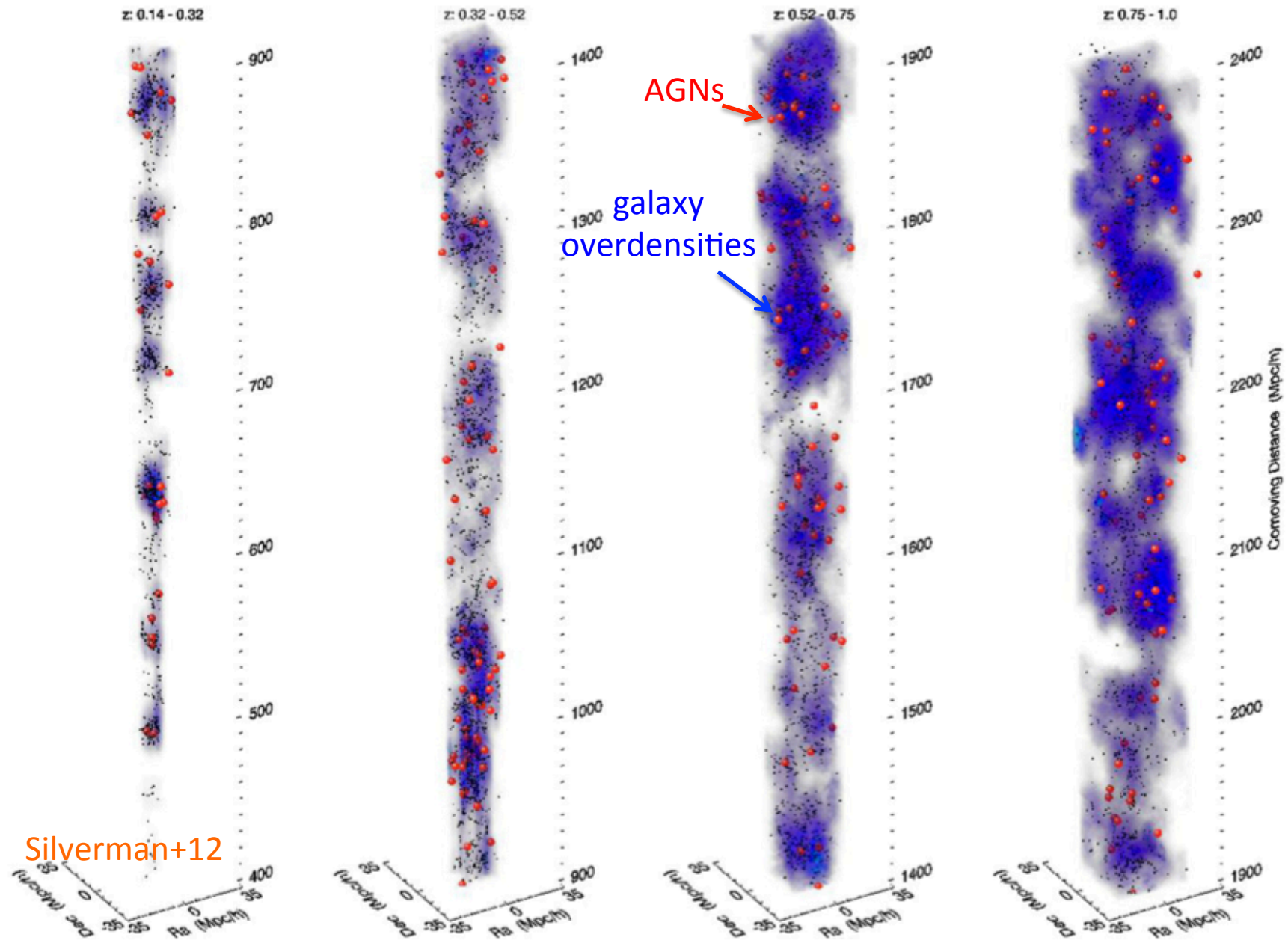


Yet, X-rays fail to identify Compton thick AGNs

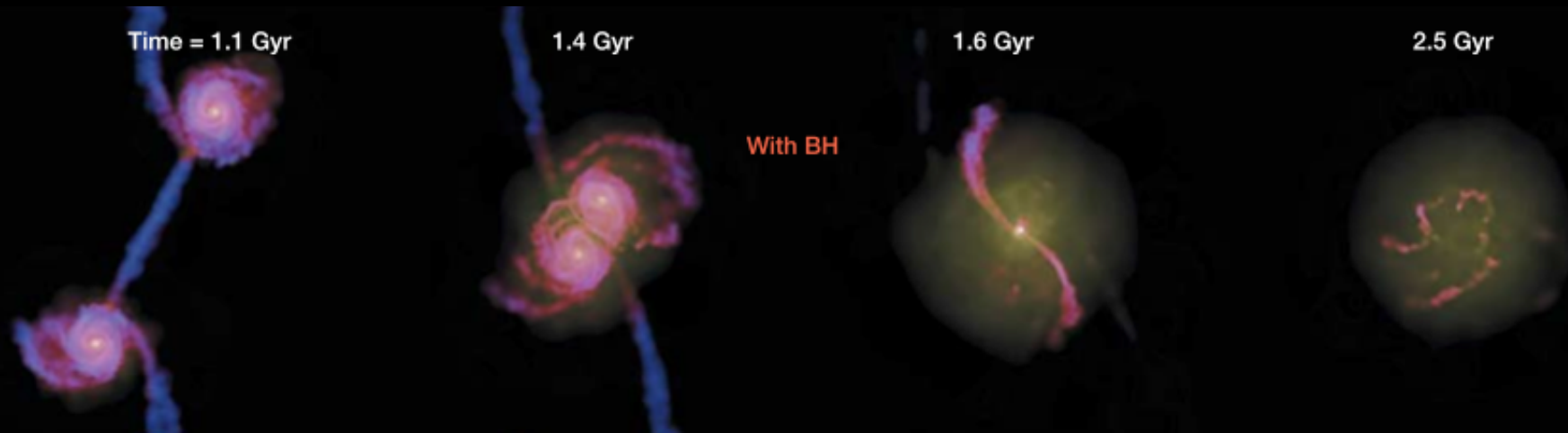
SPICA will unambiguously identify 100's (~1000) of AGNs through mid-IR diagnostics, out to high redshift...



... and locate them into the cosmic web



Negative feedback



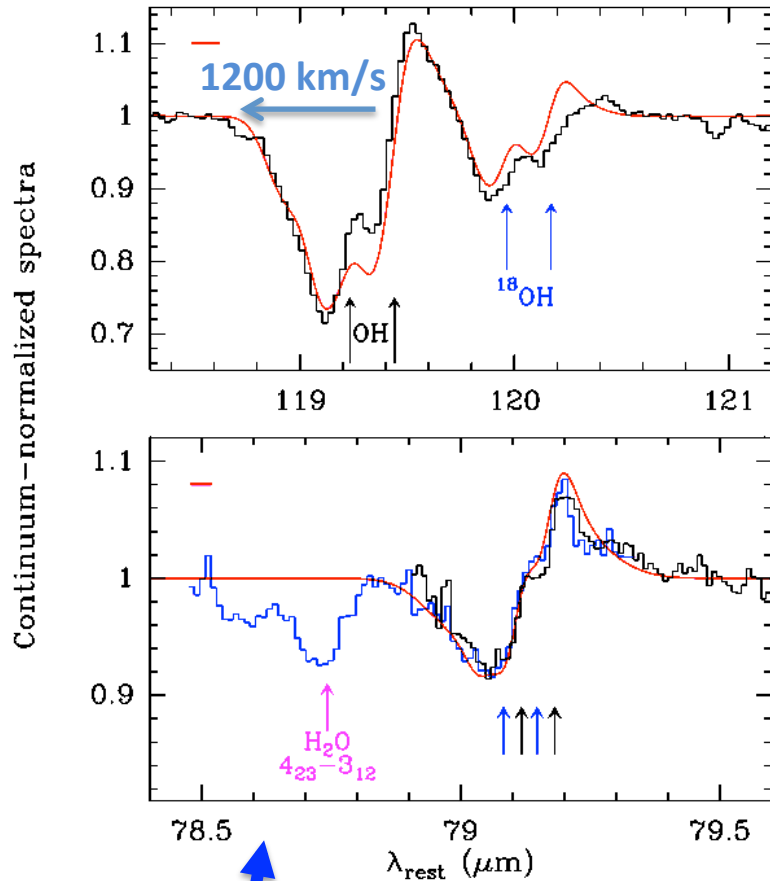
**Quasar negative feedback
invoked by most models to quench
star formation in massive galaxies**

Granato+04, Di Matteo+05, Springel+08,
Lapi+06, Menci+06,08, Narayanan+06,08,
Bower+06, Hopkins+08,+10

Quasar negative feedback

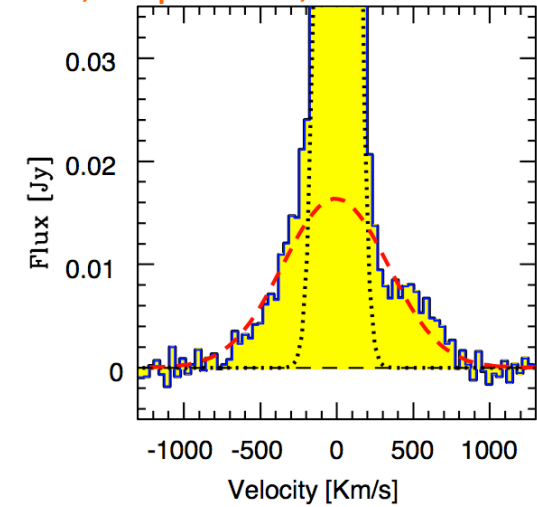
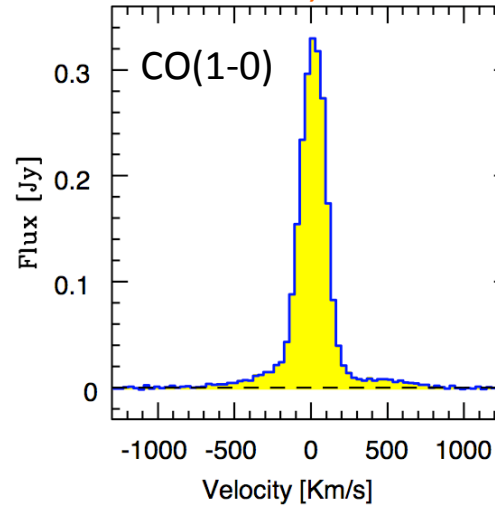
Revealed by far-IR and mm observations

Fischer+10, Sturm+11, Gracia-Caprio+12



Feruglio+10, Aalto+12, Ciccone+12, Weiss+12

Nesvadba+11, Alexander+10, Rupke+11, Maiolino+12



SPICA: will unambiguously detect AGN-driven massive outflows in thousands of galaxies and trace its evolution throughout the cosmic epochs

Positive Quasar Feedback: the third mode of galaxy formation

AGN feedback and triggering of star formation in galaxies

W. Ishibashi* and A. C. Fabian

Outflows of stars due to quasar feedback

Kastytis Zubovas¹, Sergei Nayakshin¹, Sergey Sazonov^{2,3} and Rashid Sunyaev^{3,2}

Jet-induced star formation in gas-rich galaxies

V. Gaibler^{1,2*}, S. Khochfar², M. Krause^{2,3} and J. Silk^{4,5}

