B.J. Barris and J.L. Tonry, “Redshift-independent Distances to Type Ia SNs”

Distance estimates with SN Type Ia:

(t_0, A_V, R_D, z, d) parameter space.

D is of interest, others are marginalized over or cut upon.

Methods:

-- dm15

-- MLCS

-- stretch

-- BATM

They are “fundamentally equivalent”.

No-z for Type Ia

Redshift effect:

a) lightcurve broadening by (1+z)

b) SED mapping into the bandpasses

Spectroscopic observations are a limiting factor for current and future surveys => Is is possible to do photometry only?

The issues are:

a) Type II etc contamination – some attempts to select on color.

b) distances with SN-based photo-z, which is then marginalized on.

The goal of the paper is to proove that (b) is a valid approach.

A nearby SN sample test with BATM.

SN- and galaxy-based photo-z

The authors make a point that their photo-z are different from host galaxy-based redshift estimates:
unlike galaxy case, SN magnitude is much more meaningful measurement, “helping” photo-z.

The logic seems flawed here: unlike the galaxy case, we want to use the SN magnitude for cosmology etc. One more known, one more unknown.
(Unless one assumes a cosmology, or has another distance meas. technique for the same data...)

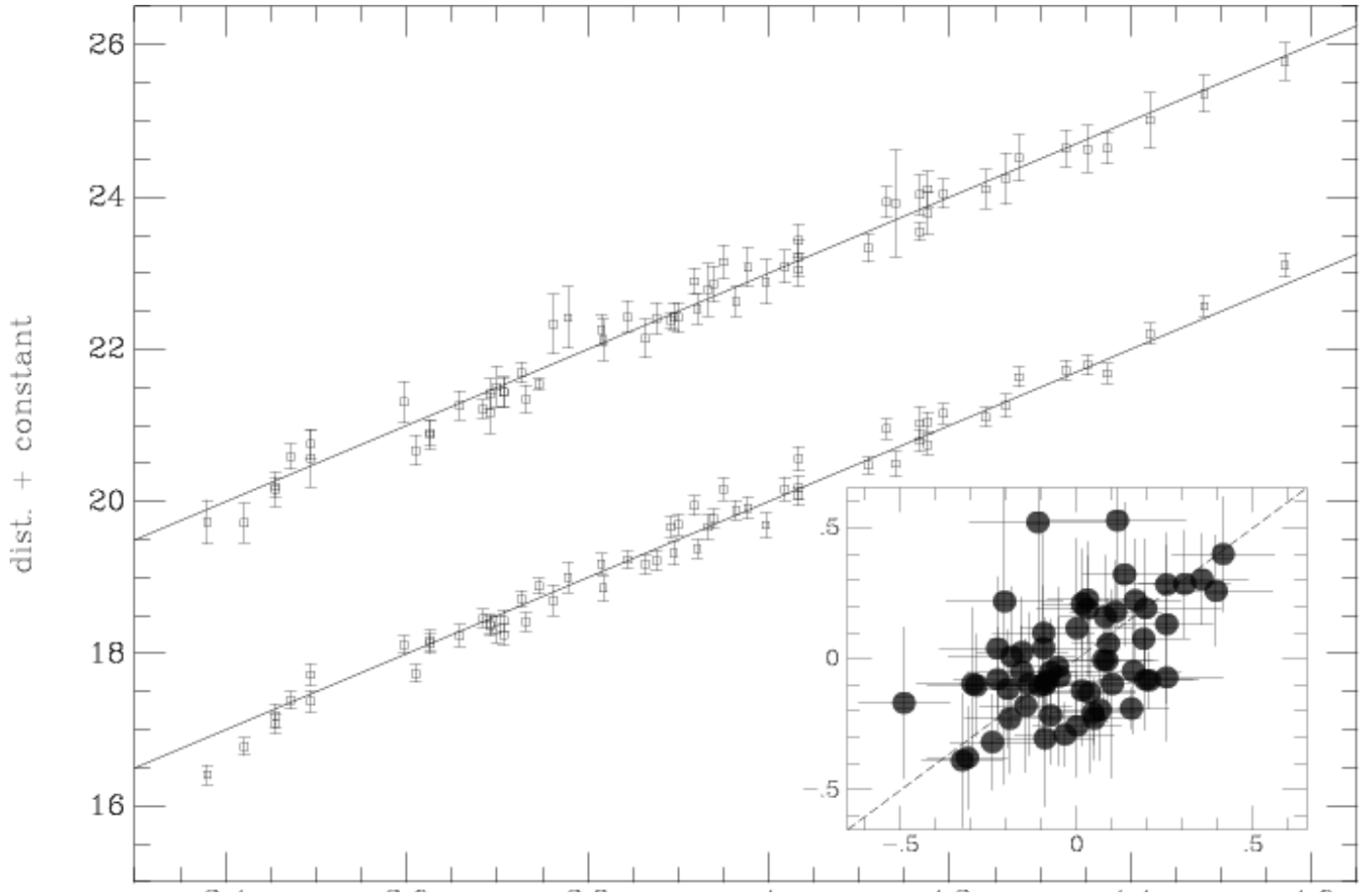
What's going on?

For the stretch method (apart from the SED/bandpasses mapping issue), the redshift comes together with stretch.
Lightcurve width = (1+z)*s .
s is then used to calibrate the absolute magnitude.

No explicit measurement of z => no abs. mag. calibration,
s=1 assumption.
Authors talk about “distances”, but “maximum magnitudes” are better in this context. Distance is relative and assumes a cosmology.

$$m_B = M + 5\log D_L(z; Omega_M, Omega_L) - \alpha(s-1)$$

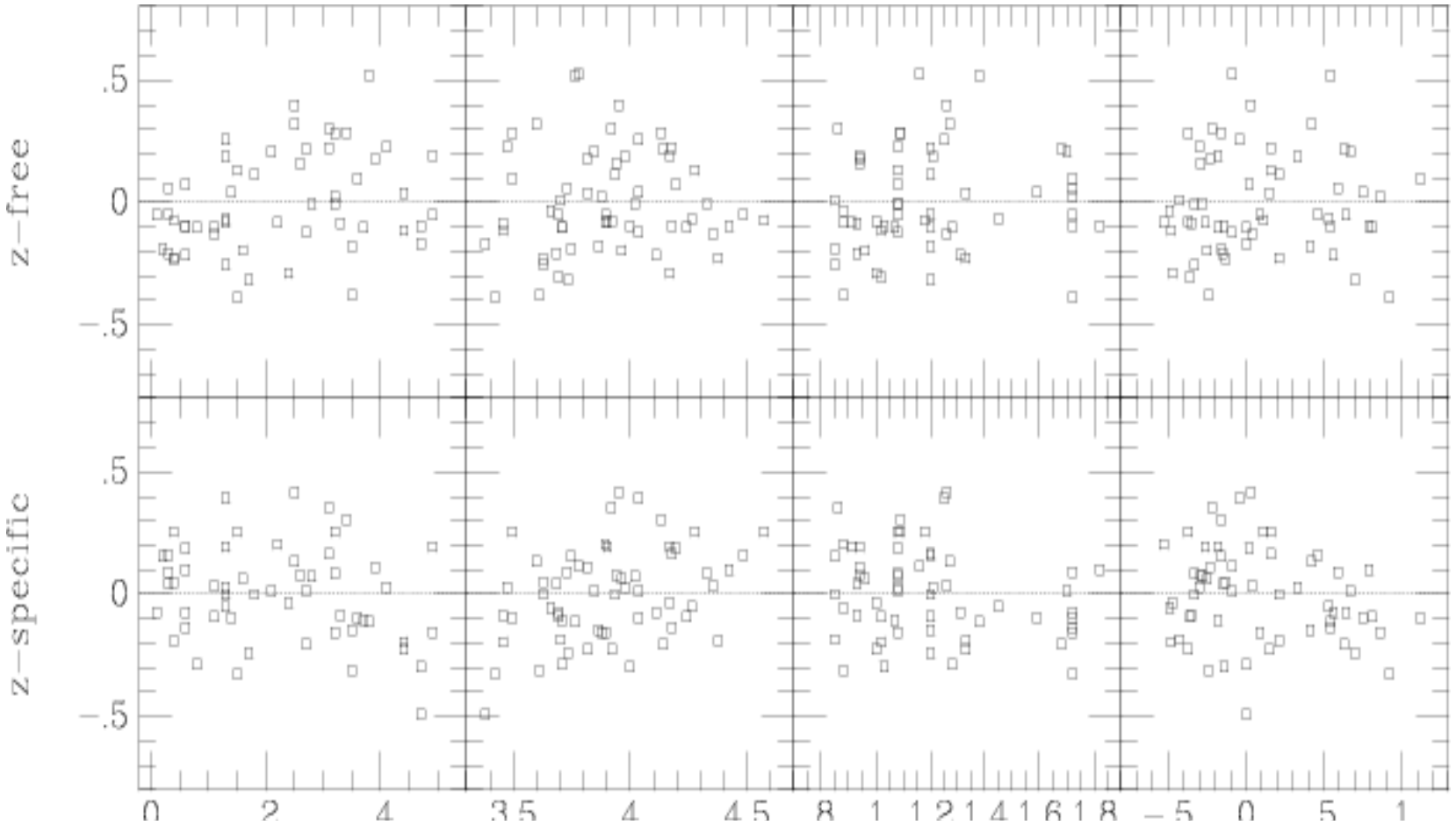
Hubble Plot



Top with photo-z, bottom with std. method. X axis is the spectr. z.

The insert shows the residuals.

Possible Biases



Conclusions

- Spectroscopic obs. availability is a legitimate concern.
- It makes sense to attempt no-redshift considerations to add SNe w\o spectroscopy.
- Non-type Ia contamination is a concern.
- The SN weight for cosmology meas. is much less. Other science (rates, host types etc), is not so affected.

Near and High-Redshift