

# SN Ia without spectroscopy

Spectroscopy **already** limiting factor  
→ restrain to **photometry**

identification?

redshift?



LSST

1 million SNIa (photo-z only)  
 $z < 0.8$

- Selection of SNIa without spectroscopy
- Cosmology with photometric selection and redshifts

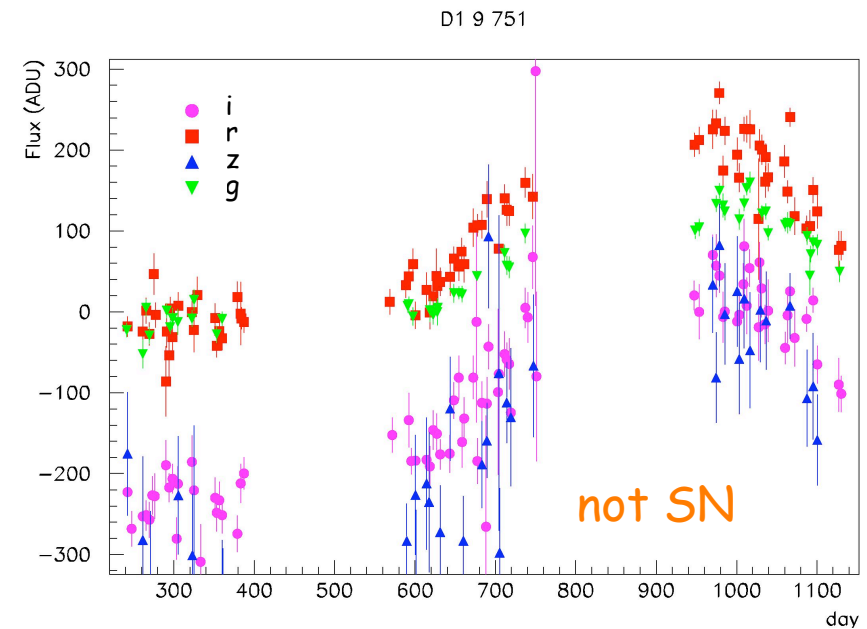
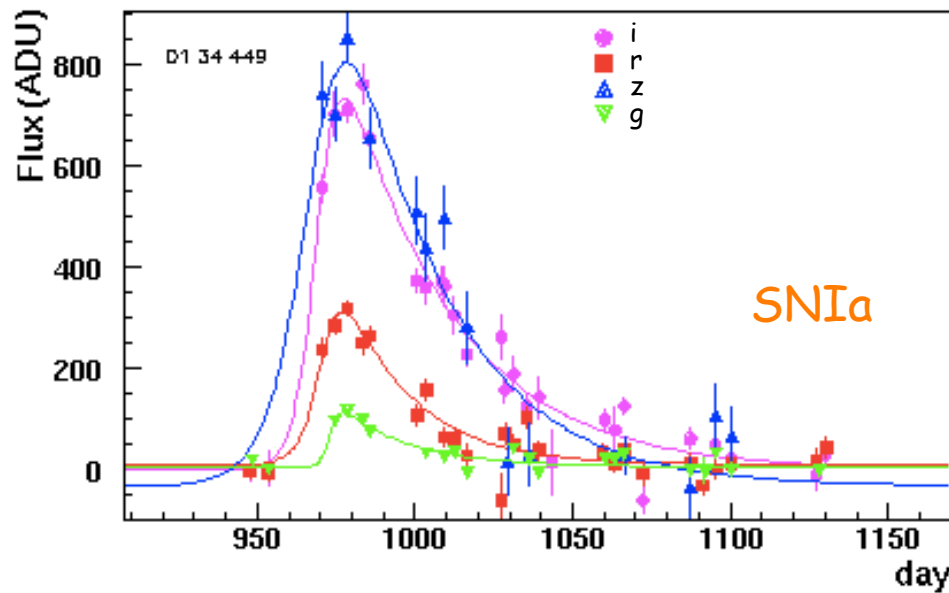
# Photometric study with SNLS

Rolling search mode

1 observation / 4 nights

4 bands *griz*

⇒ record of all transient events



# Photometric study with SNLS

Rolling search mode

1 observation / 4 nights

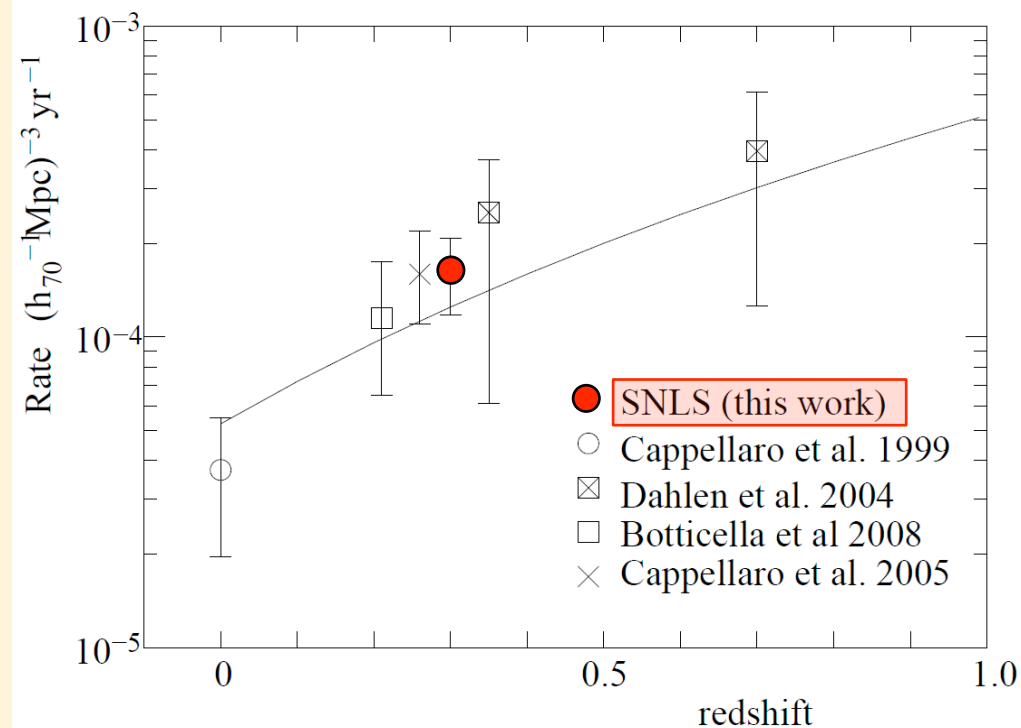
4 bands *griz*

⇒ record of **all transient events**

Photometric selection  
of **117 SNCC**

**Core-collapse rate**

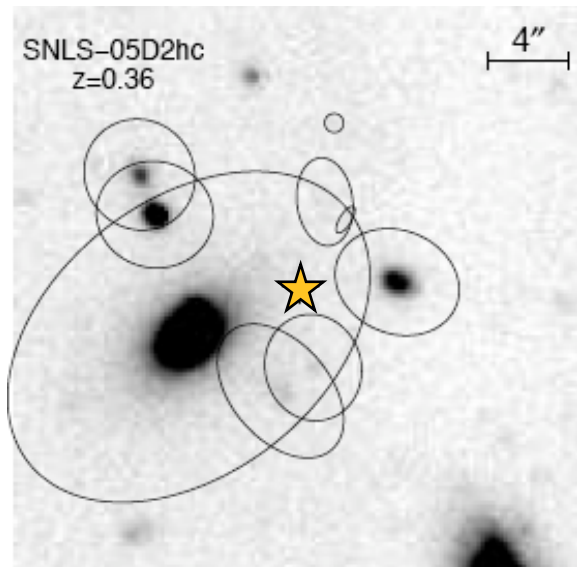
G.Bazin et al.,  
*A&A*, 499 (2009) 653



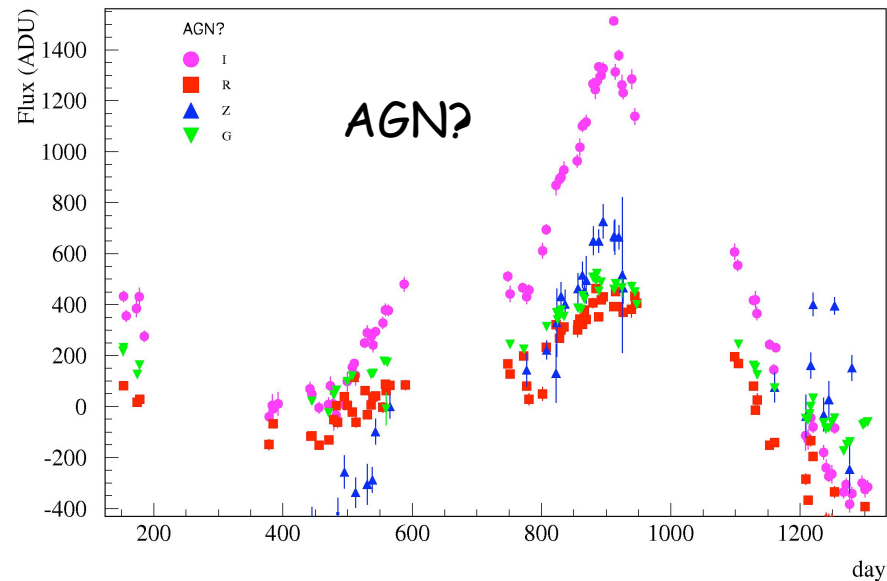
# Photometric selection of SNIa (1/2)

<b>detections in <math>i'</math></b>	<b>300 000</b>
<b>rejection of noise, stars, AGNs</b>	<b>1500</b>

(3 year sample)



Nathalie Palanque-Delabrouille



Identifiable host with **photometric redshift**  
O. Ilbert et al., *A&A* 457 (2006) 841I

83% of events with  $z_{gal}$

# Photometric selection of SNIa (2/2)

fit for SNIa (SALT2\*) at  $z_{\text{gal}}$   
→ color, stretch

\*SALT2: J. Guy et al.,  
A&A 466 (2007) 11

rejection of  
bad  $z_{\text{gal}}$   
core-collapse

has $z_{\text{gal}}$	1200
cuts on stretch, color color-magnitude as Ia	511

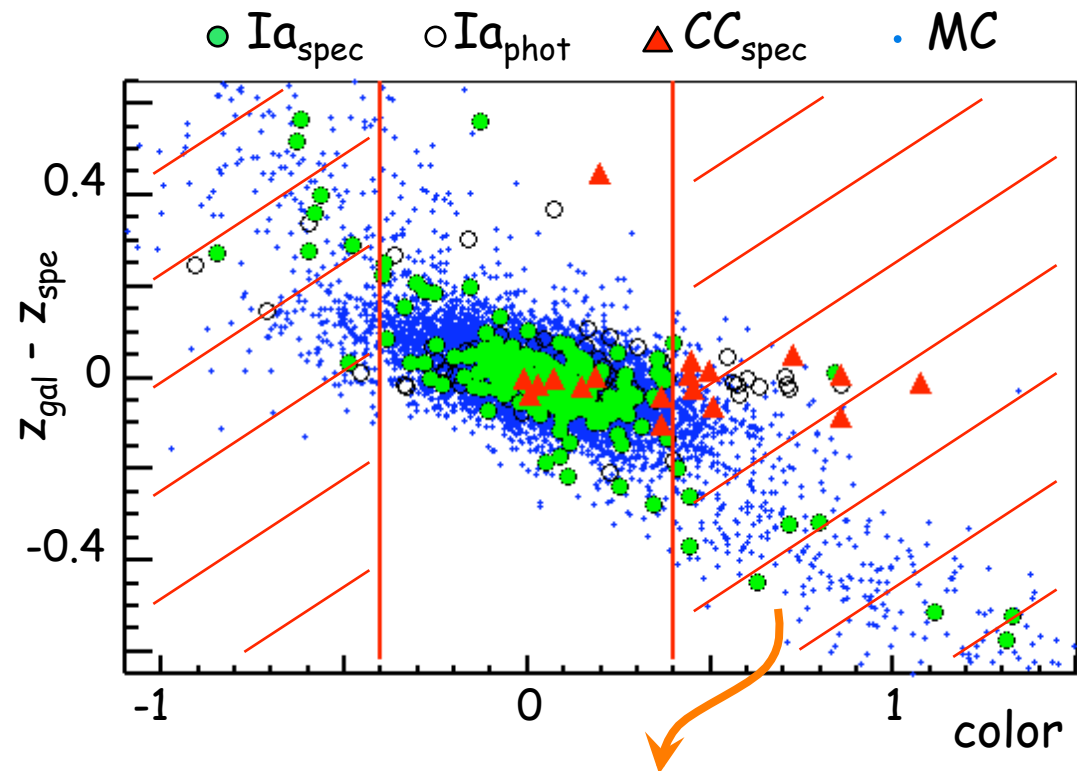
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50% of extreme colors ↔ bad  $z_{gal}$

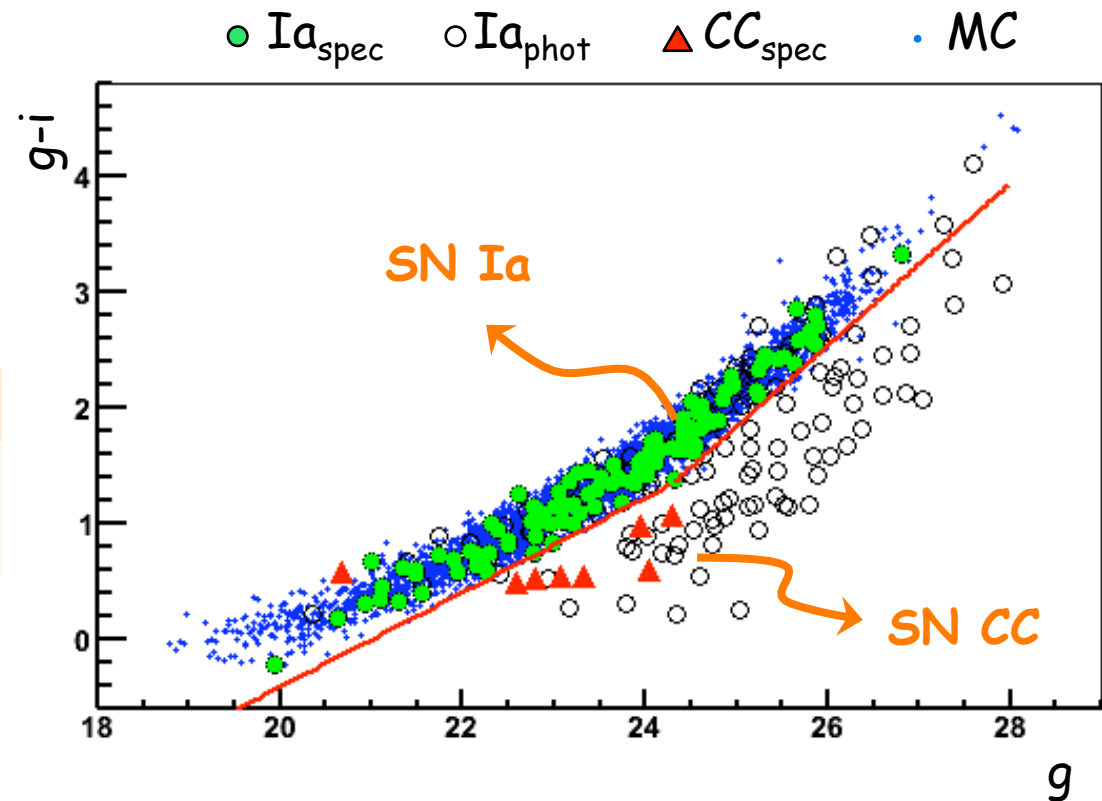
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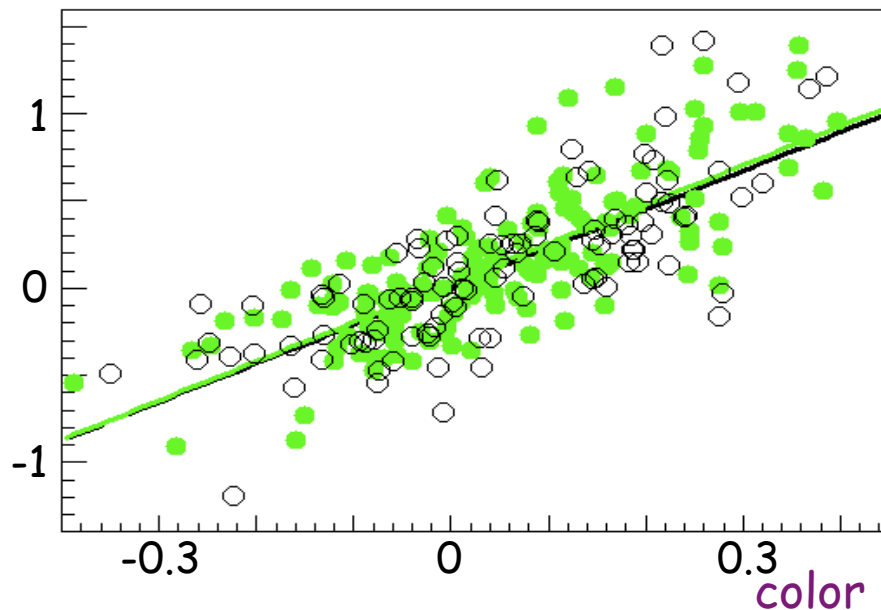
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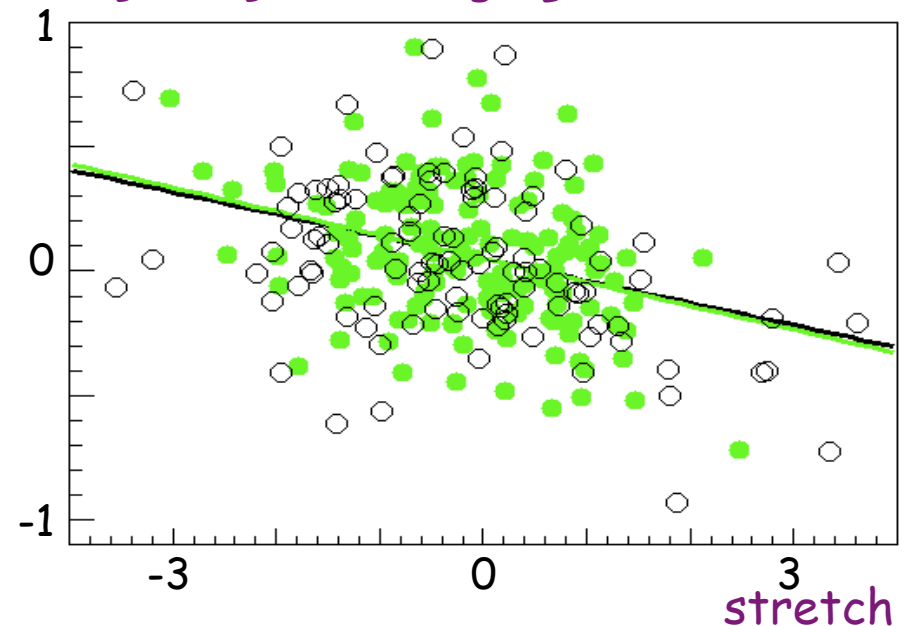
# Samples comparison

511 events  $\left[ \begin{array}{l} \bullet 181 \text{ Ia}_{\text{spec}} \\ \circ 330 \text{ Ia}_{\text{phot}} \end{array} \right.$

$m_B - [M_B - \alpha(s-1)] - 5\log(d_L)$  vs. color



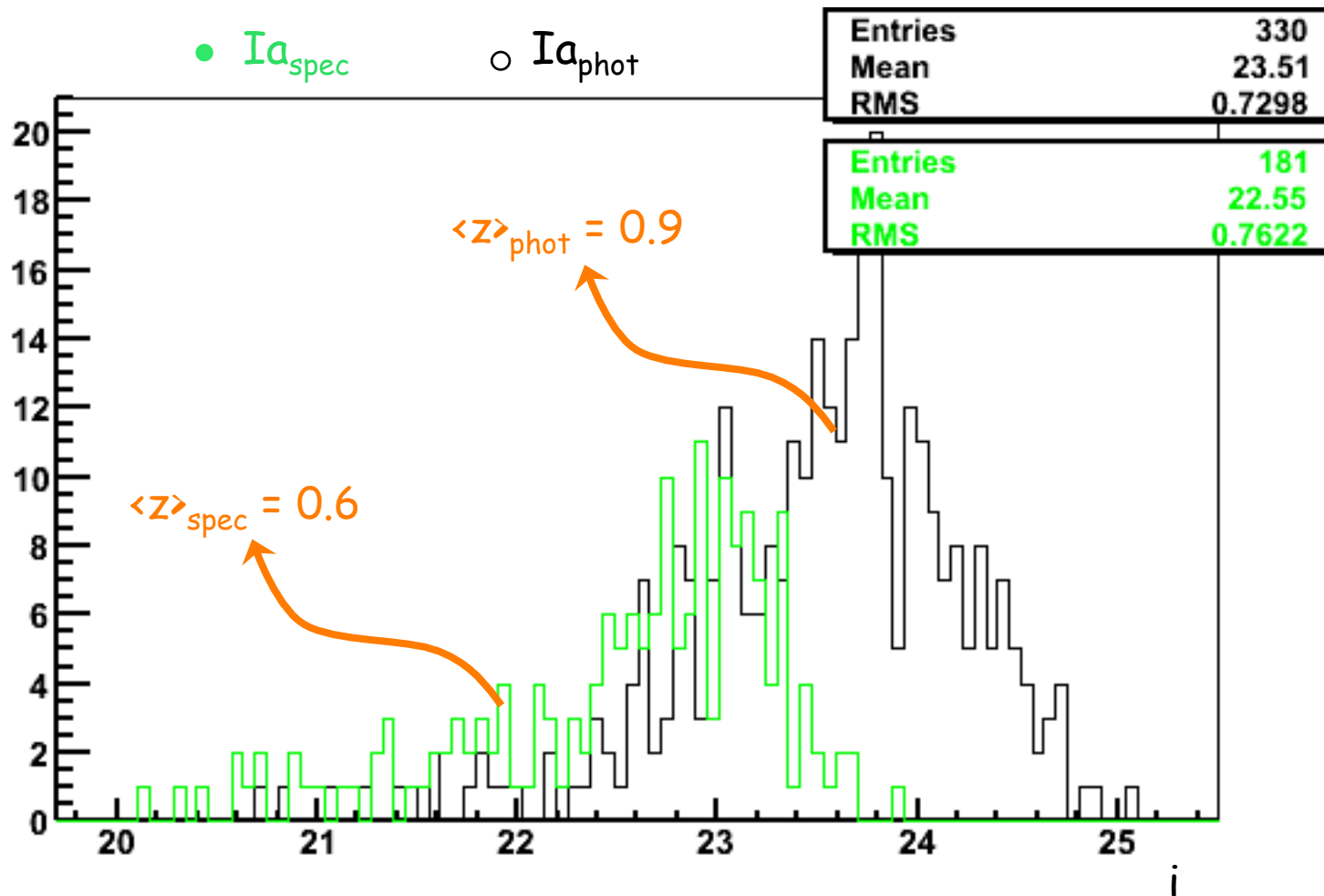
$m_B - [M_B - \beta c] - 5\log(d_L)$  vs. stretch



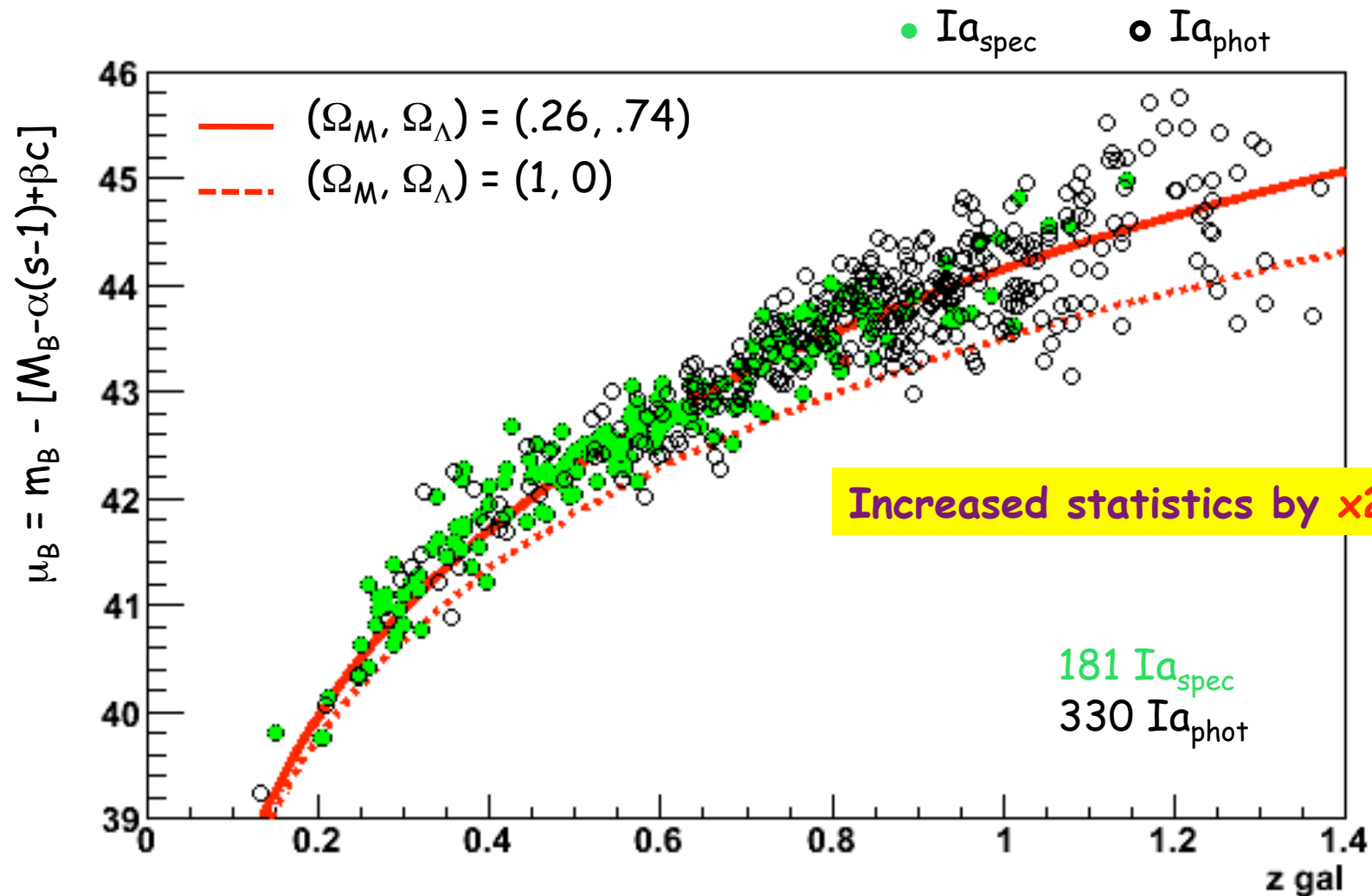
brighter-bluer, brighter-slower relations : excellent agreement  
(over common magnitude range)



# Sample comparison



# Photometric Hubble diagram



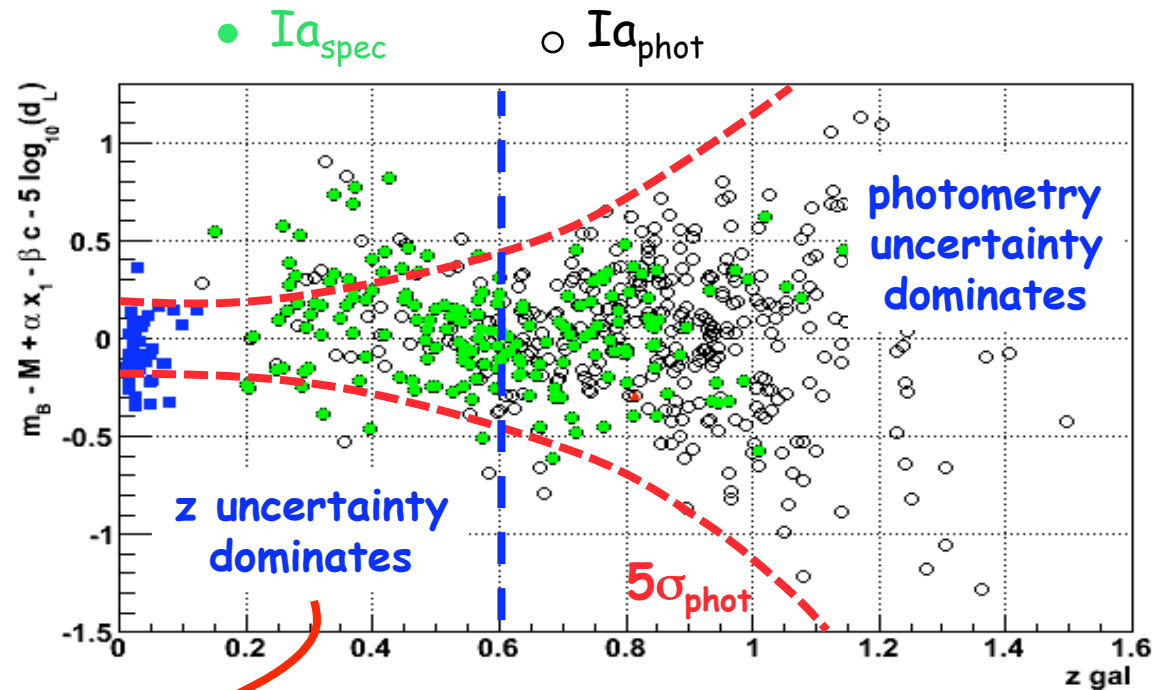
ongoing  
work

# Cosmology without spectra?

Fit of  $(\Omega_M, \Omega_\Lambda)$

bias of  $\sim 0.05$  on  $\Omega_M$   
due to use of  $z_{gal}$

no bias if  $5\sigma_{phot}$  clipping

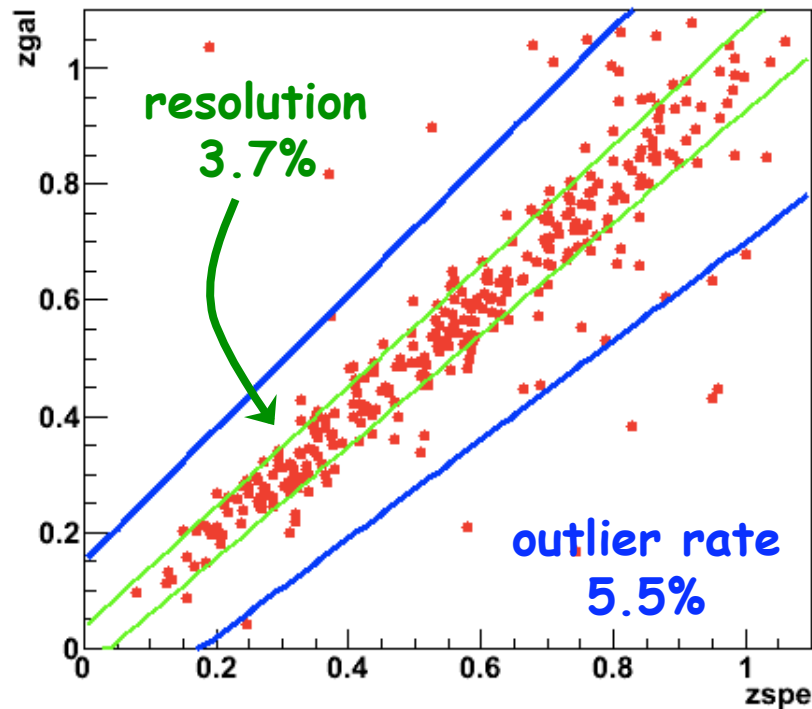


need improved  $\sigma_z$  for  $z < 0.6$

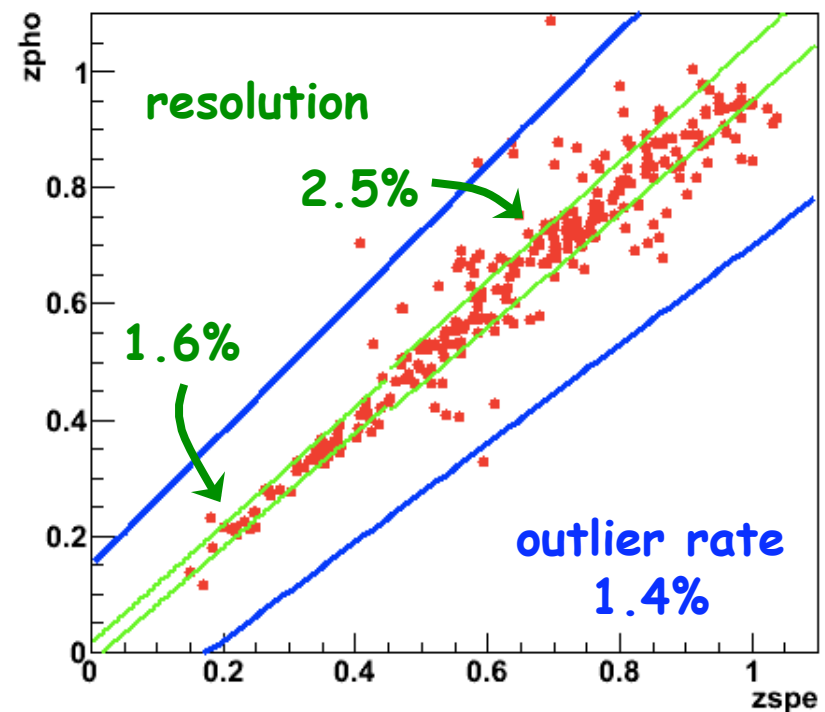
ongoing  
work

# Cosmology without spectra?

host galaxy  
photometric redshift



SN  
photometric redshift



A first step towards SN cosmology without spectroscopy