Cosmology with LSST Photometric Supernovae

Ayan Mitra
Eric Linder

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Board No : XXX

Being able to use the large sample of Photo-z SNe Ia efficiently in the cosmological parameter estimation will provide more leverage(and efficiency) to SN cosmology

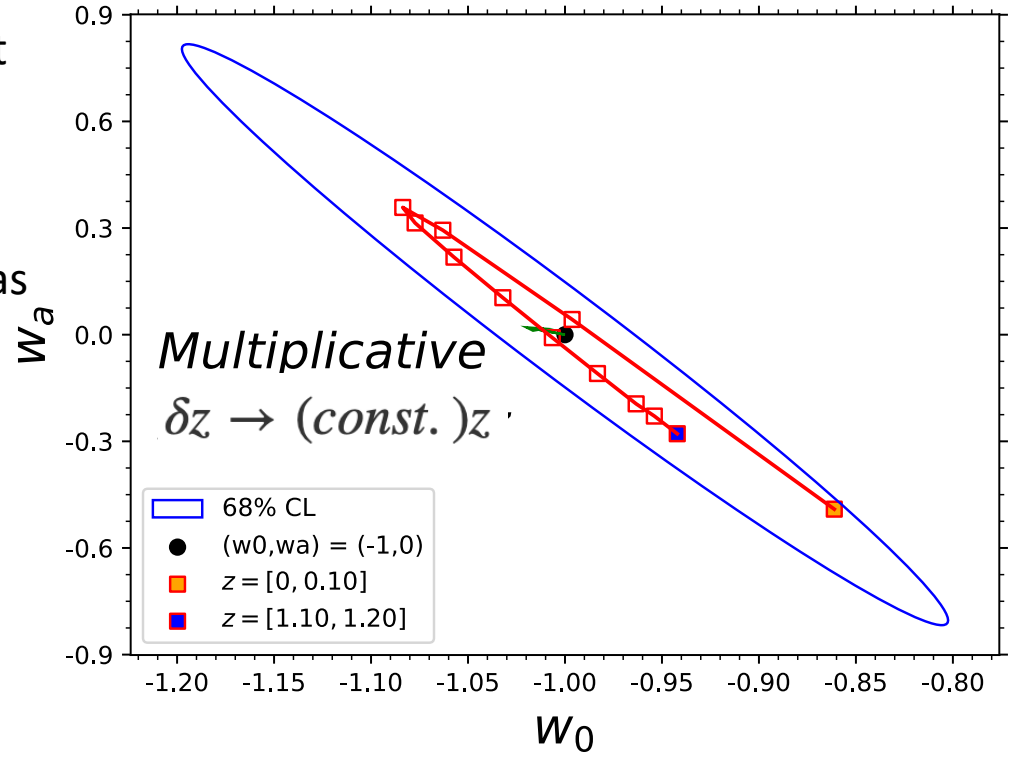
Uncertainties on redshift measurement -> Cosmology parameter bias

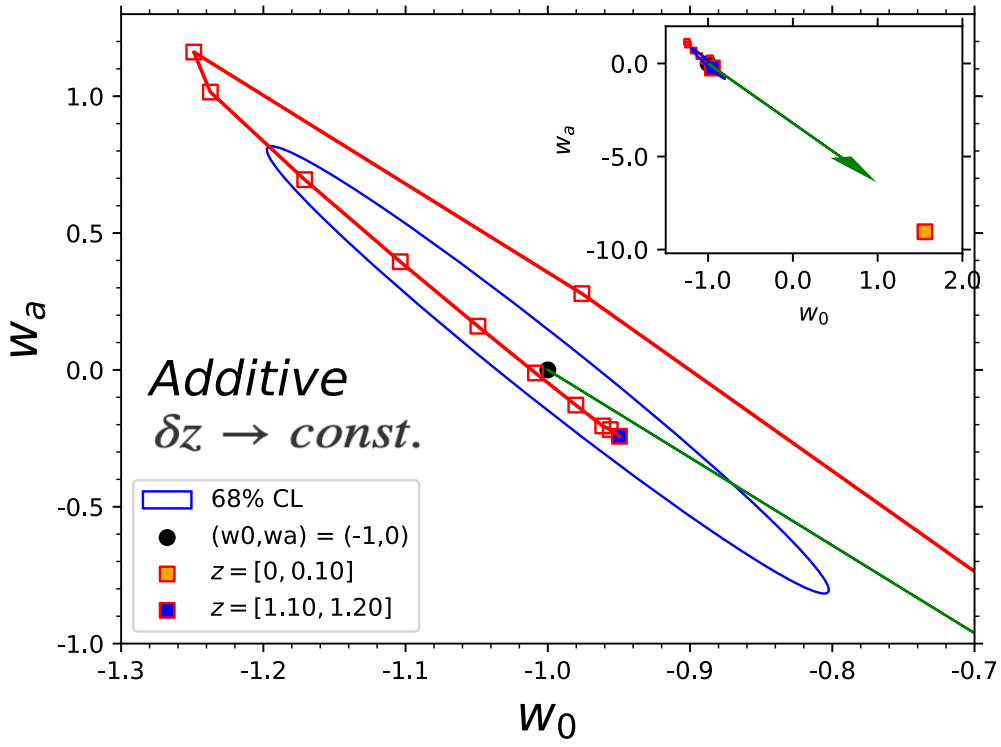
For Small offsets: To study the effect on cosmological parameters estimation that the z- systematic will have (propagate into), we used the Fisher Bias technique

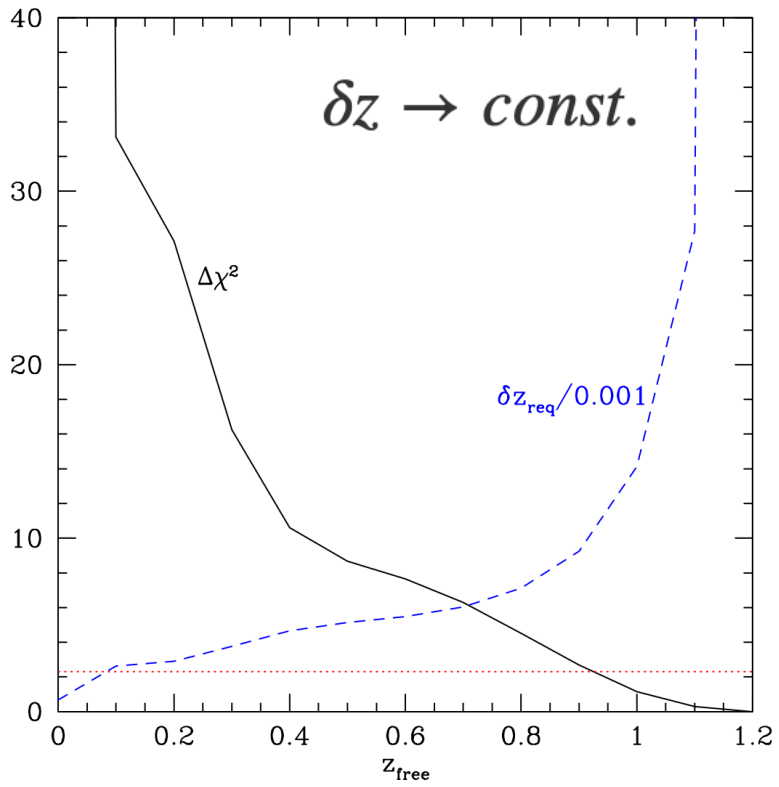
$$\delta z \rightarrow \delta m \rightarrow \delta(cosmology)_{Parameter}$$

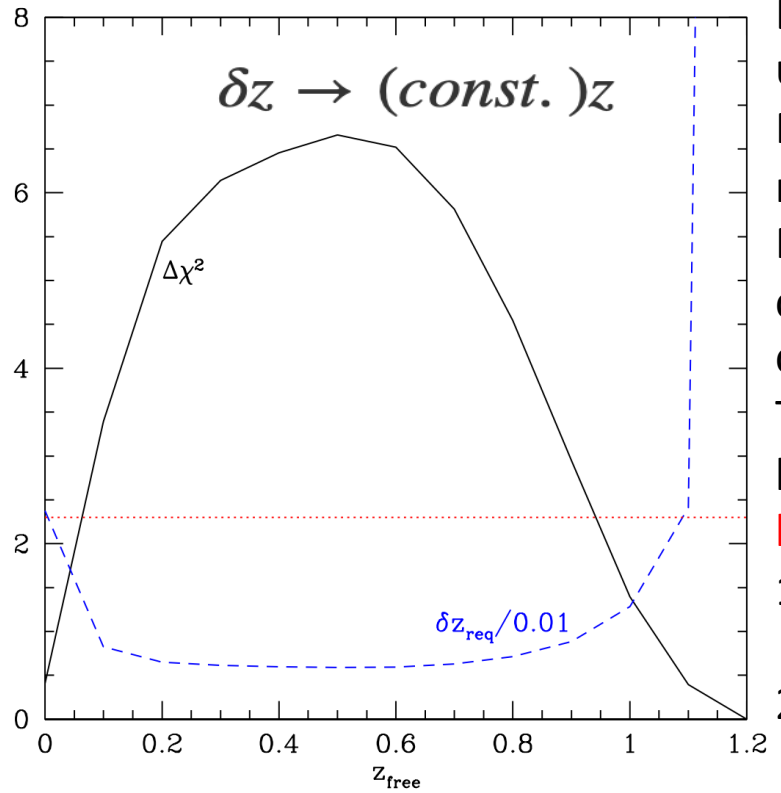
Lowest redshift bins [z < 0.5] gives the strongest dark energy bias

Some of that effect is neutralized by other higher z-bins









By use of a spectroscopic sample upto a *z_free*, we show the :
Requirement on the remaining redshifts for the
Precision on del_z and the corresponding chi-square margin constraint.
To avoid substantial cosmology bias(which is under the red dotted horizontal line) :

1) Require Spectroscopic sample upto z = 0.9 and higher
2) Or have spectroscopic sample to any point z free and at higher redshifts have systematics under the del_z curve (blue dotted)

Conclusion : Spectroscopy for the majority of the supernova is required.
We are currently redoing the the project with LSST, as an external collaborator.

Current Status : Post Doctoral Fellow at ECL, Kazakhstan with Prof. Eric Linder
Ongoing Projects :
Review : Spectral based classification of OzDes galactic data using ML. *David Parkinson*

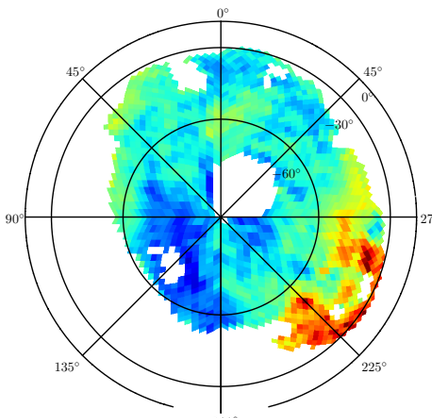
1. LSST, as external collaborator
2. Lensing with Unresolved SNe Ia light curves using ML. *E. Linder, Alex Kim, Arman Shafieloo, Satadru Bag*
3. Standard Siren (gravitational waves) project. *David Mota, Jurgen Mifsud*
4. FRB Project : *E. Linder, George Smoot, Mehdi Shafi*
5. SNLS Lensing Project : Supratik Pal, Brun Pal.

Bayesian Inference of Emissivity of Dust in the Diffuse ISM and Large-Scale CIB map

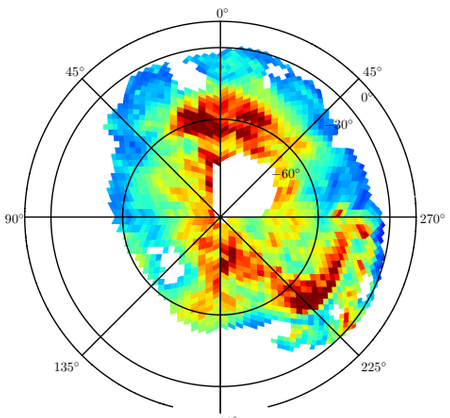
Debabrata Adak,* Shabbir Shaikh, Tuhin Ghosh, Francois Boulanger, Tarun Souradeep

- Develop a method to estimate spacial and spectral variation of emissivity of dust in 3D applying Hamiltonian MonteCarlo (HMC).
- Zero level of intensity and emissivity can be fitted over entire sky of interest.
- Dust intensity model at diffuse ISM :

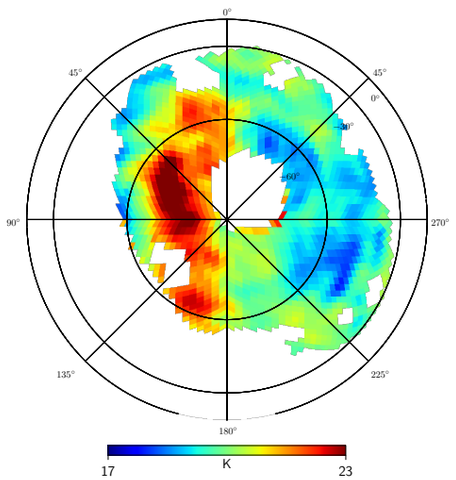
$$I_\nu(n_i) = \sum_{k=1}^{K} \epsilon^j_{k\nu} N^k_{\rm HI}(n_i) + O_\nu,$$



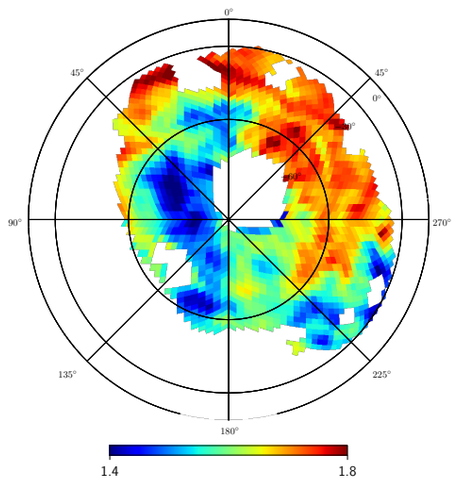
Emissivity at 353 GHz



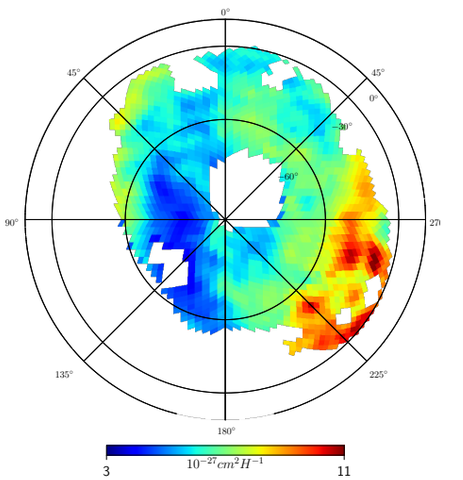
Error bar of emissivity



Dust temperature



Spectral index



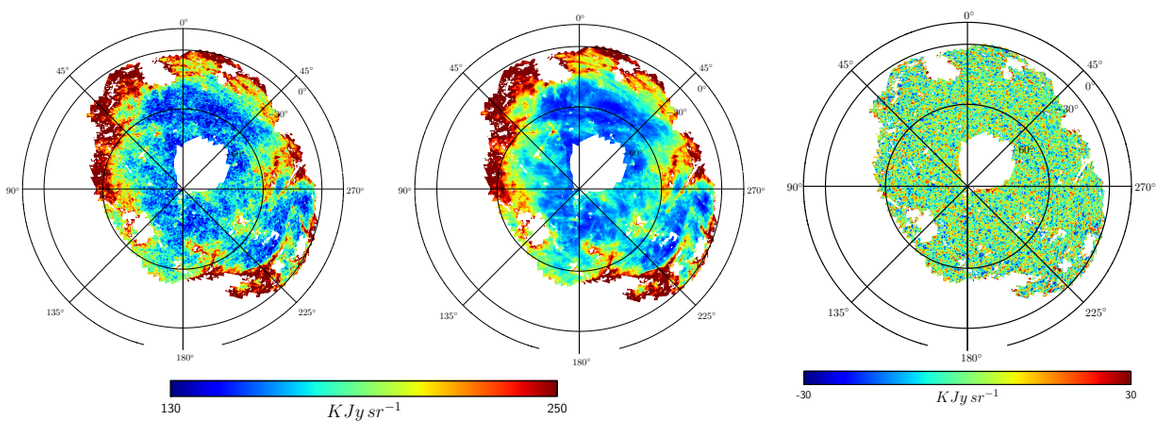
Opacity

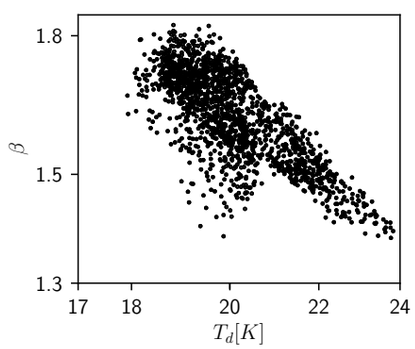
- CIB maps and power spectra

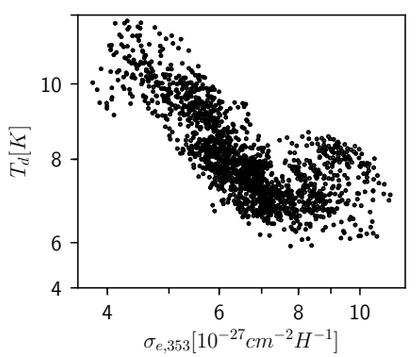
Total intensity

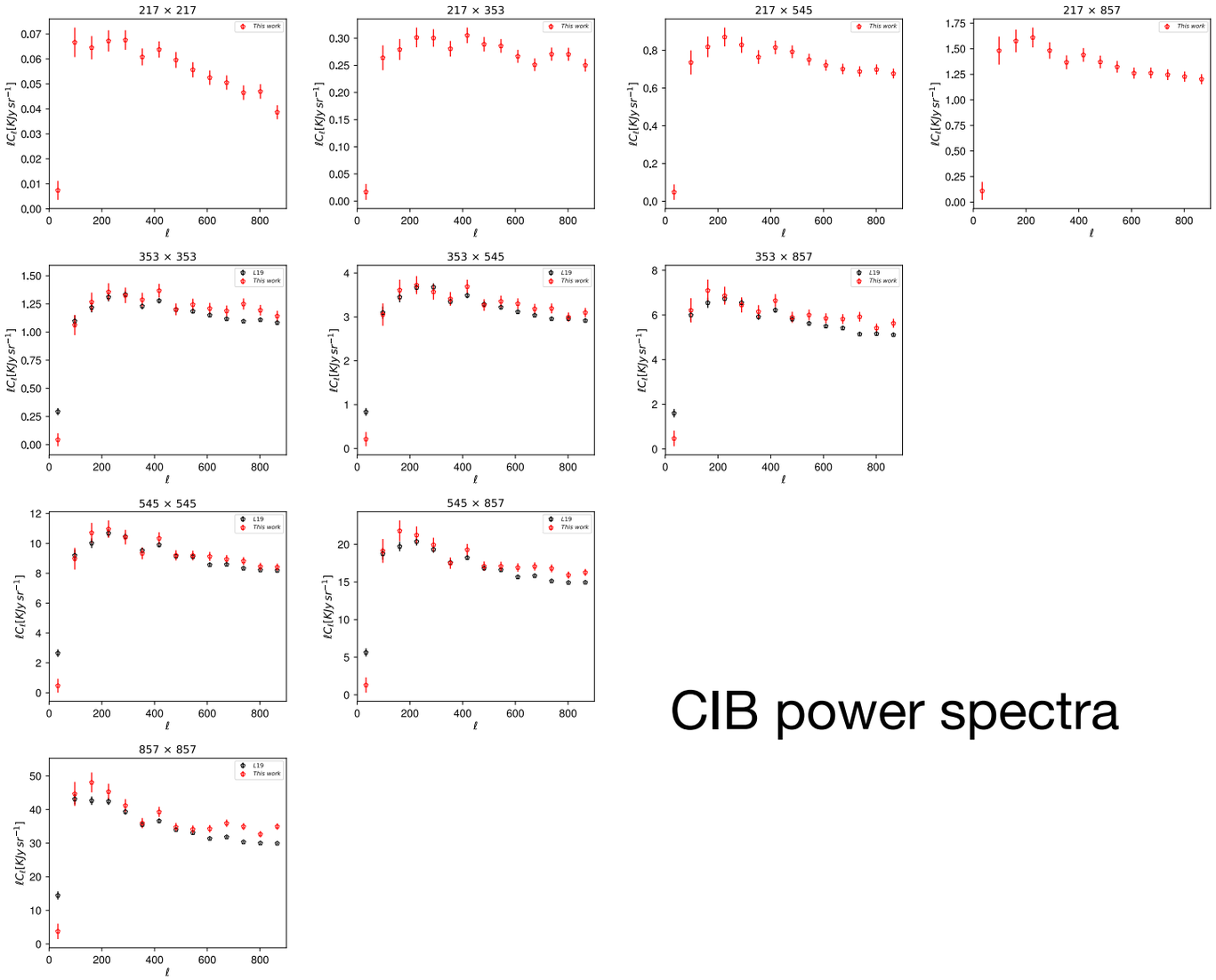
Model dust

CIB









CIB power spectra

- This technique is useful in multi-frequency dust polarisation modelling.
- CIB maps are useful in study of large scale structure and delensing

Thank you