

lognormal_lens

- A quick and handy code
 - for studying cross-correlation of density fluctuations and galaxy distribution
 - and with other tracers of density
- “Log-normal lensing simulation for HSC and the cross-correlation with PFS galaxies”

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lognormal_lens

- **Inputs:** one file with minimum parameters
 - Cosmology
 - Power spectra of density fluctuations
 - Spec-survey parameters (PFS)
 - redshift ranges
 - galaxy density
 - galaxy bias
 - opening angle (square geometry)
 - Photo-survey parameters (HSC)
 - source galaxy distribution/density
 - shape noise
- **Outputs:** a set of maps (in 35 min with 1 core)

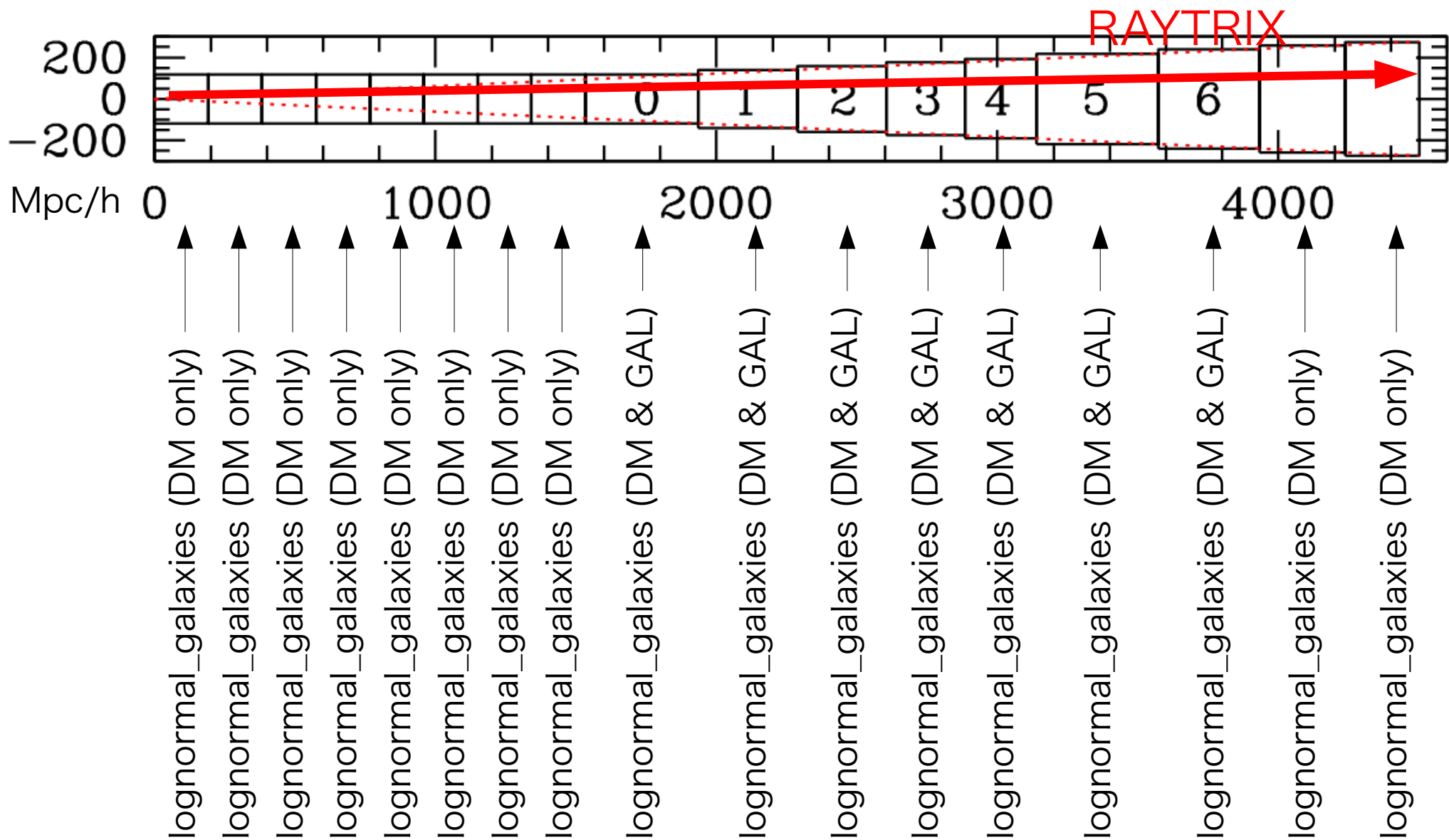


lognormal_lens consists of...

- **lognormal_galaxies** (by Makiya-san+)
 - without any modification
 - generates DM and GALAXY distributions
 - will be public soon
- **RAYTRIX** (by Hamana-san)
 - with some modifications
 - public
 - massively used and tested in HSC-related work

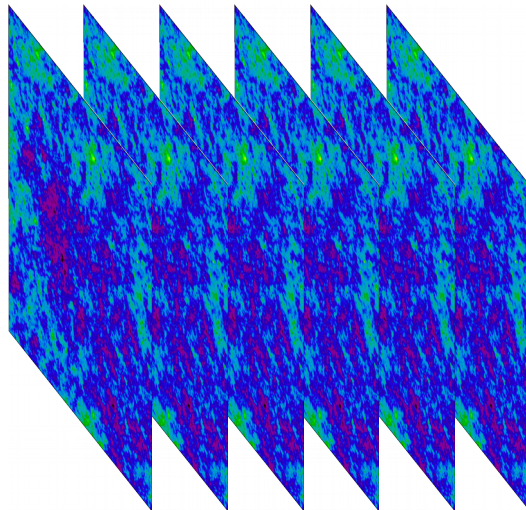
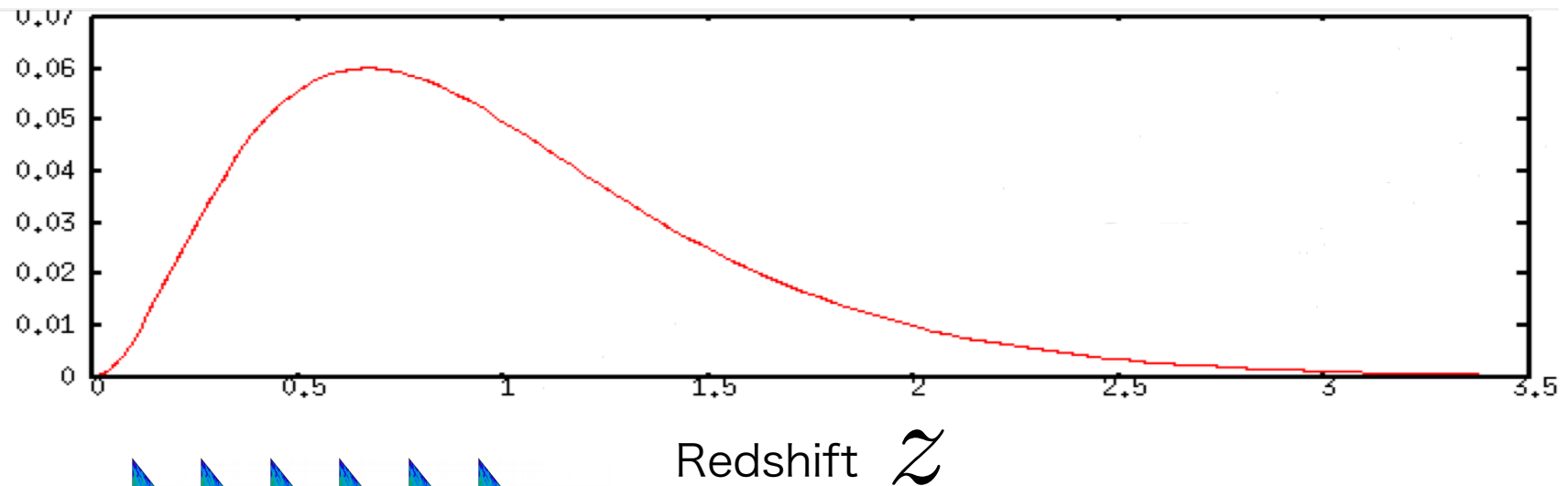


Ray tracing geometry



Source redshift distribution

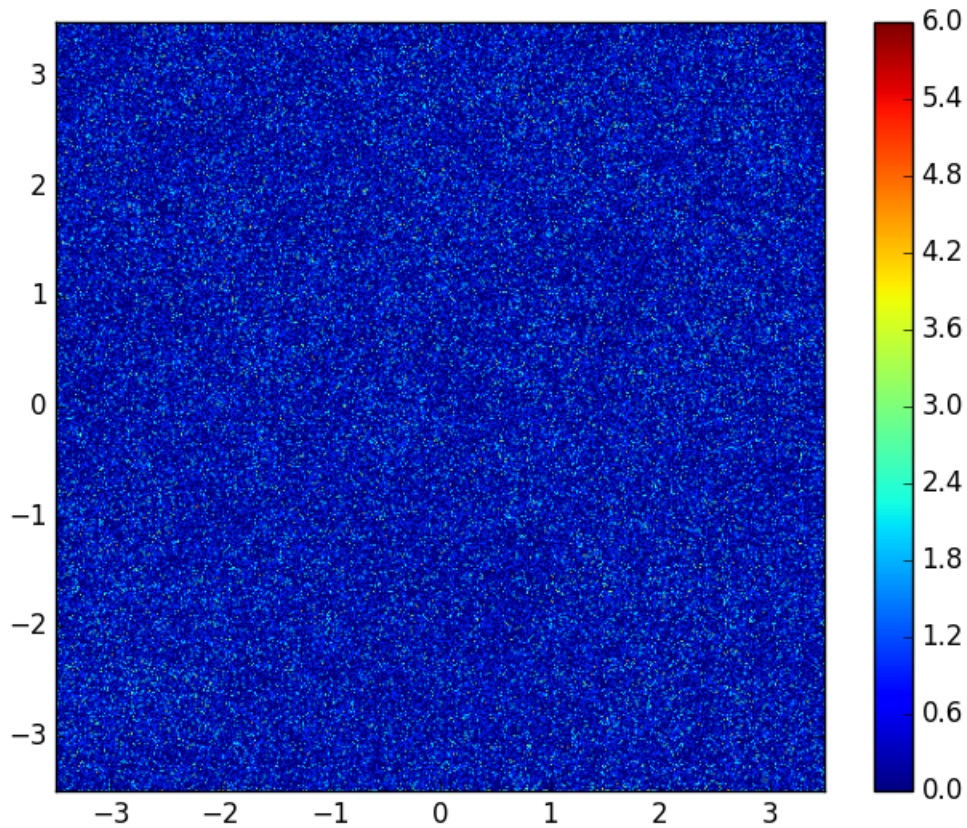
$$p(z) \propto z^2 \exp\left(-\frac{z}{z_0}\right) \quad z_0 = 1/3 \text{ for HSC}$$



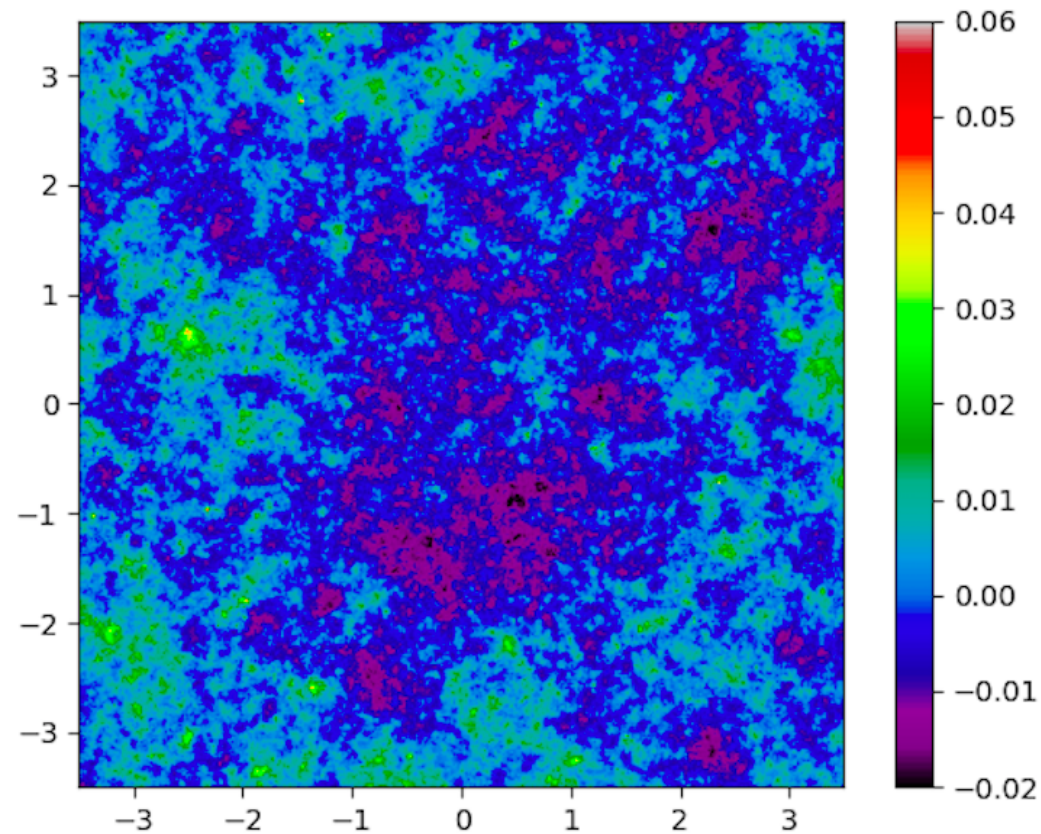
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Resulting Maps

Galaxy map



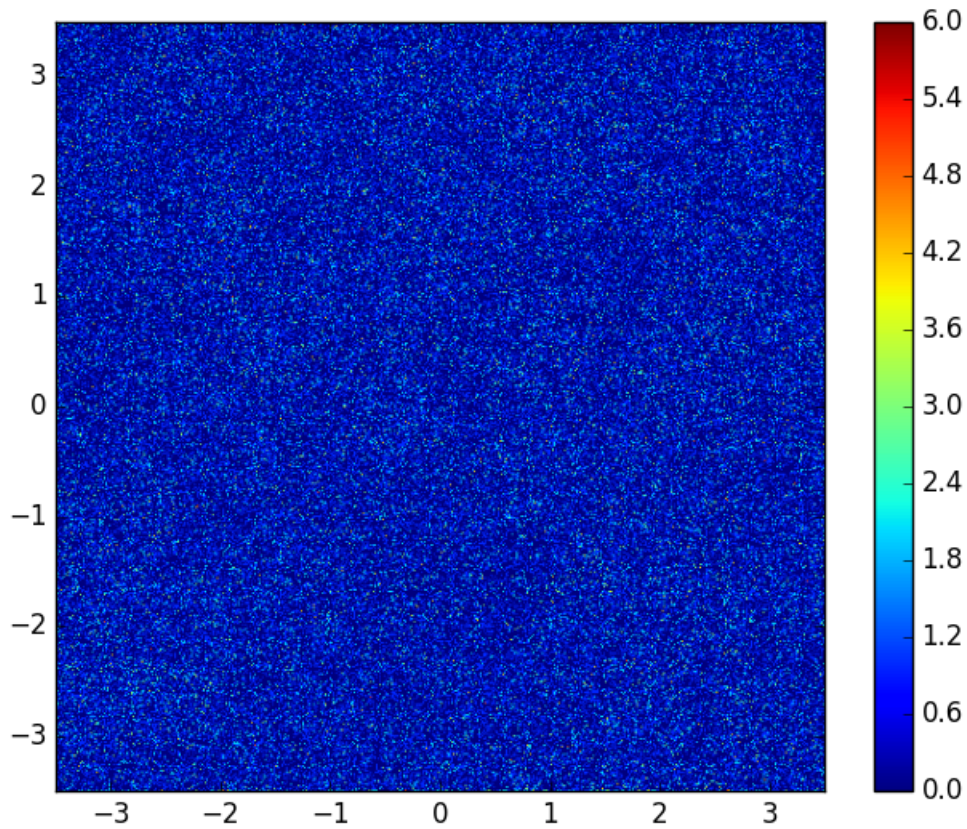
Lensing (convergence) map



PFS galaxies $z = 0.6\sim 2.4$

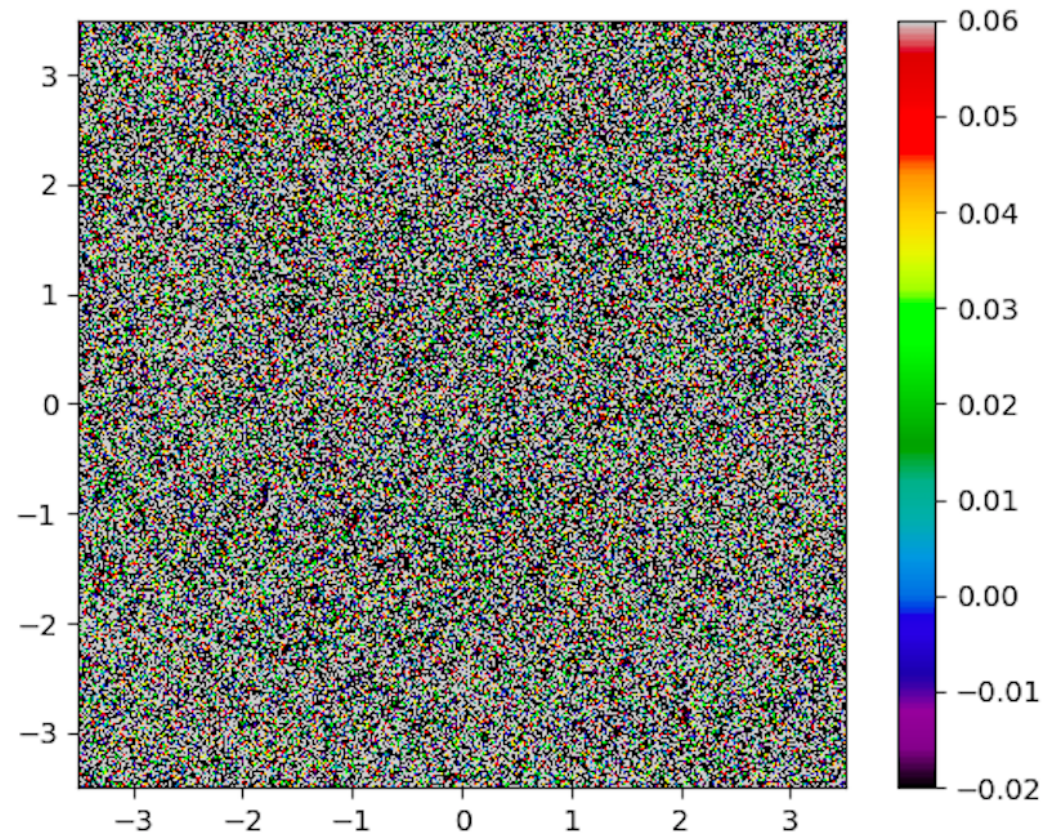
Resulting Maps

Galaxy map



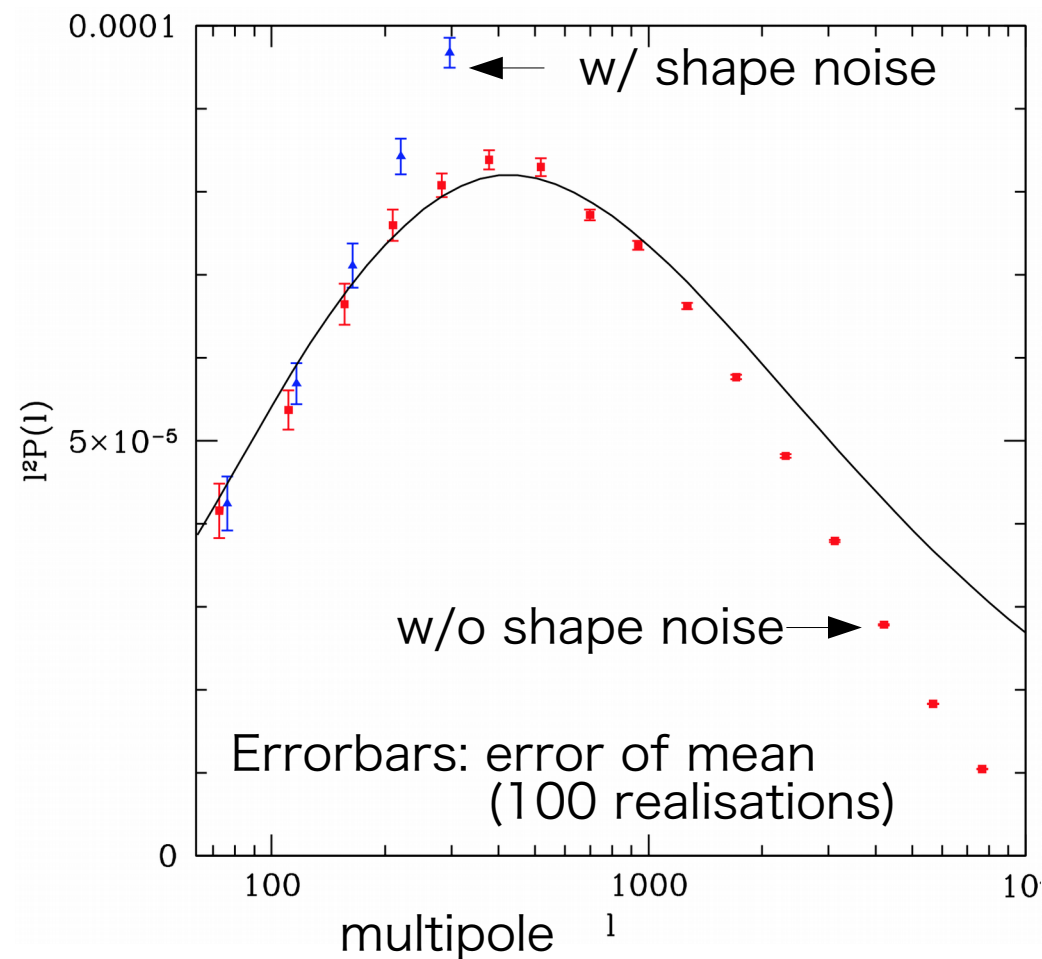
PFS galaxies $z = 0.6\sim 2.4$

Lensing (convergence) map

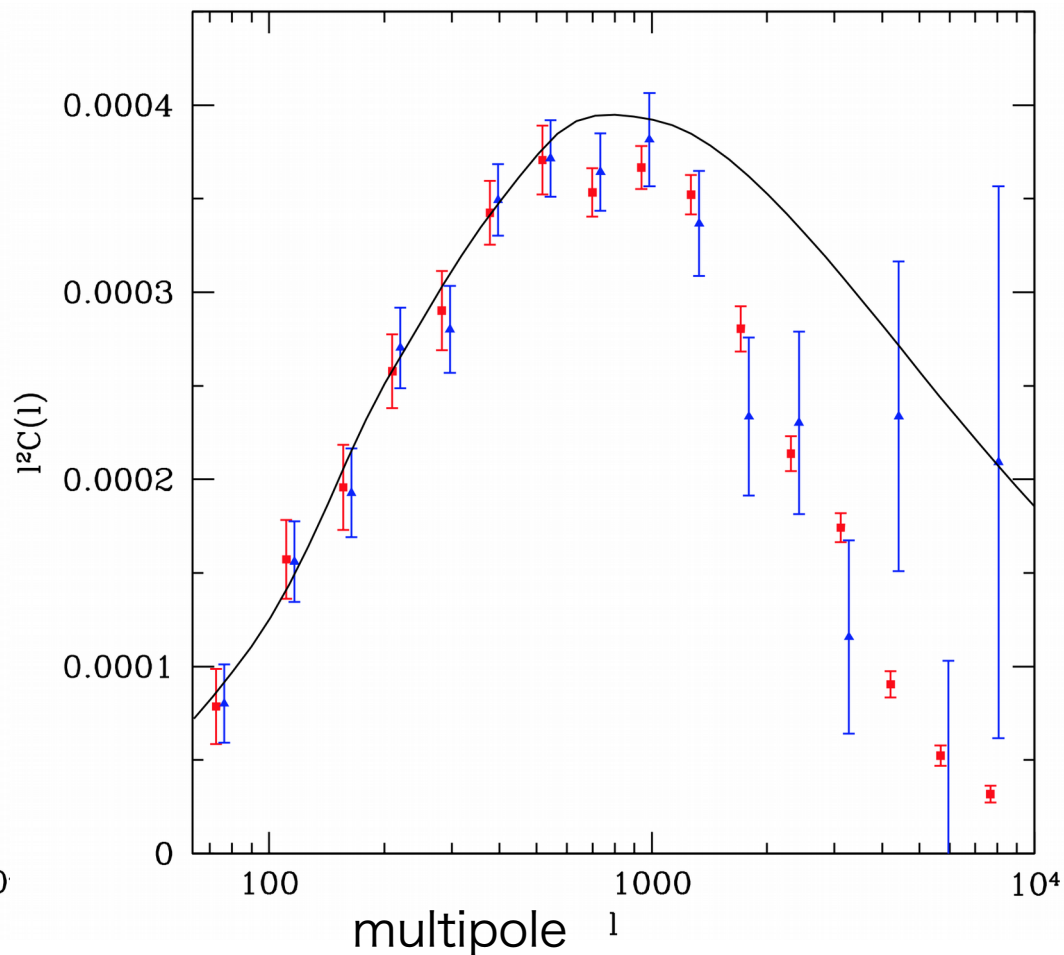


with shape noise

Resulting Power Spectra



lens-lens auto-power



lens-galaxy cross-power

TODOs

- Cross-correlation with various redshift slices of PFS galaxies
- How much the neutrino mass constraint improves by including the lensing information? **HSC-PFS synergy**
- Technical issues
 - Spatial resolution
 - Careful consideration of requirement
 - When does the 1-halo term become important?
 - Speeding up of `lognormal_galaxies`