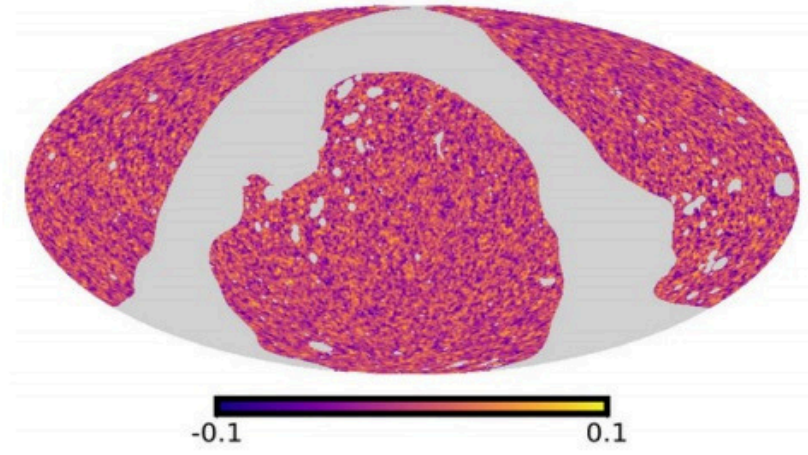


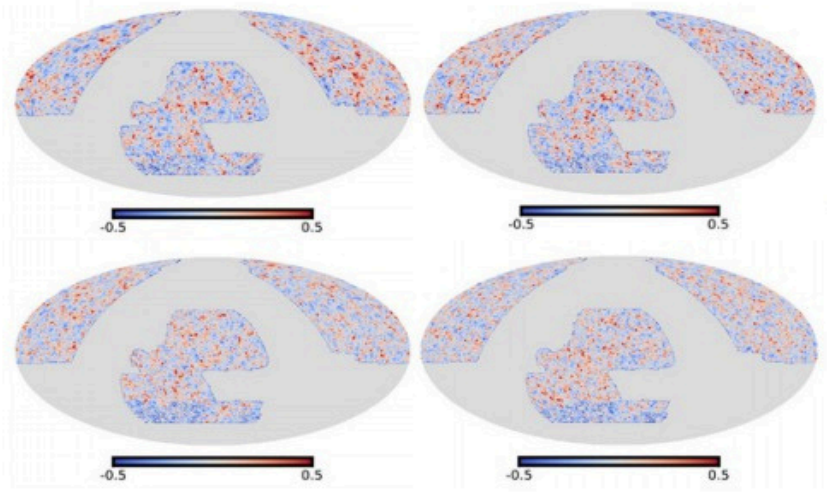
$$\kappa(\hat{n}) = \frac{1}{2} \nabla_{\perp}^2 \phi_L(\hat{n})$$

$$\kappa(\hat{n}) = \int_0^{\chi^*} d\chi' \tilde{W}^{\kappa}(\chi') \delta_m(\chi' \hat{n}, \chi')$$

Planck lensing convergence map

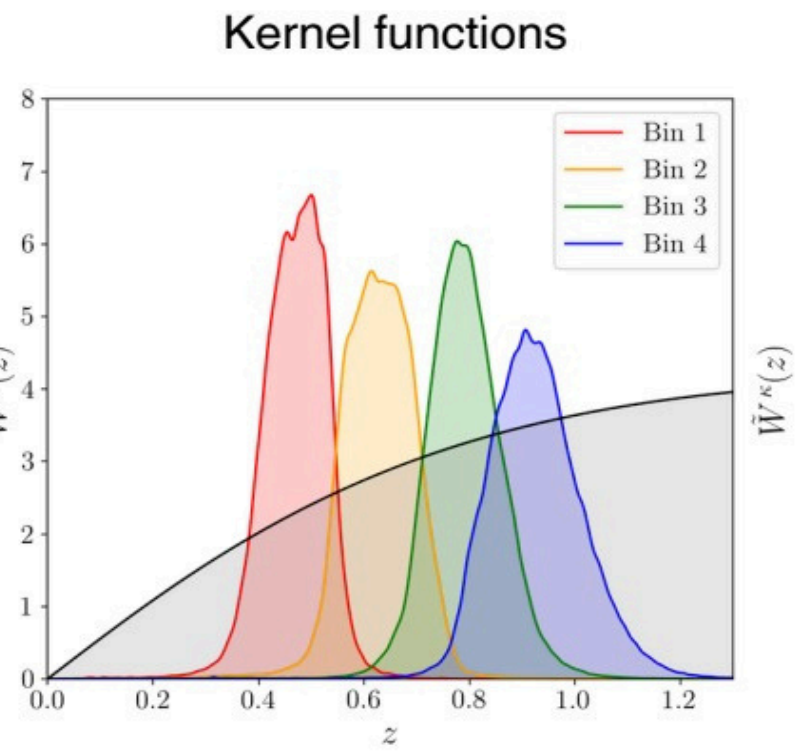
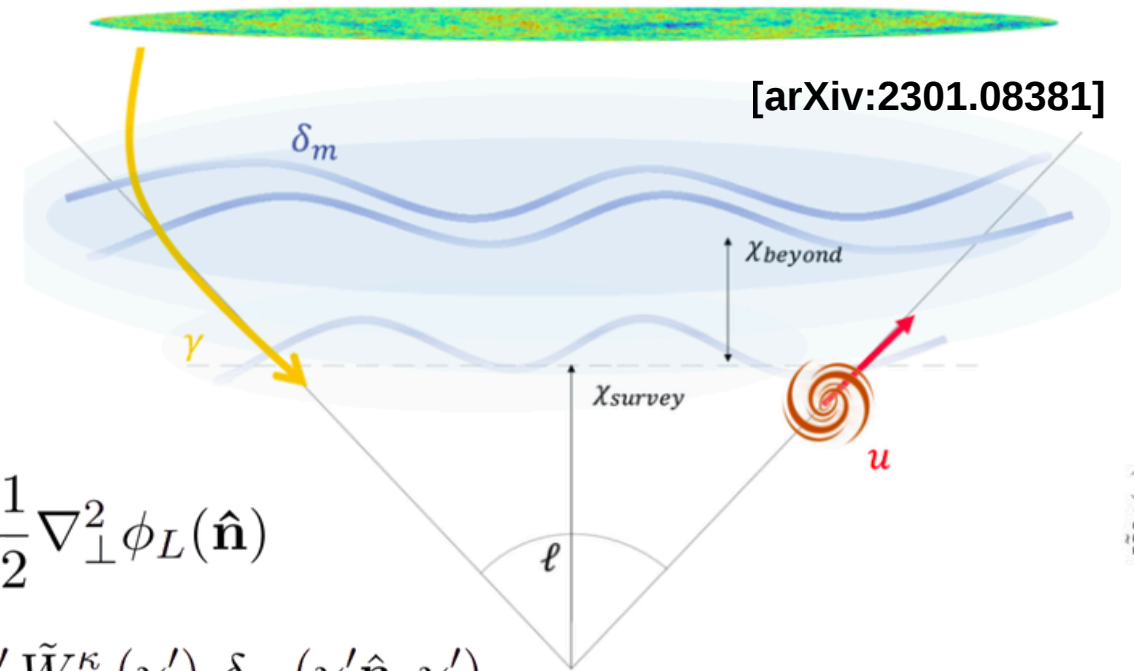


[arXiv:2504.01669]



DESI-LRGs galaxy density maps

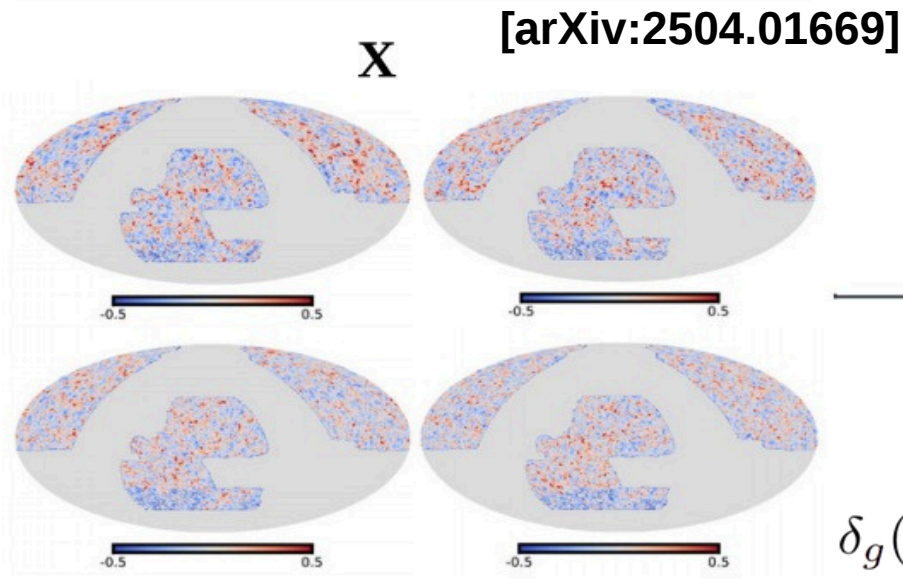
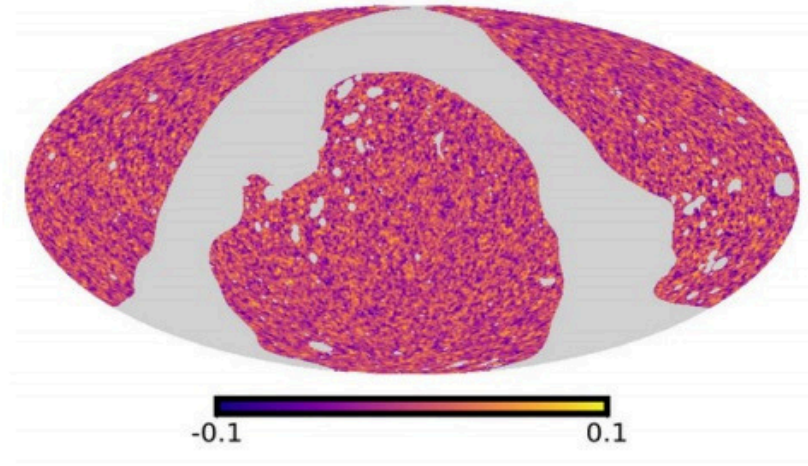
$$\delta_g(\hat{n}) = \int d\chi' \tilde{W}^g(\chi') b(z') \delta_m(\chi' \hat{n}, \chi')$$



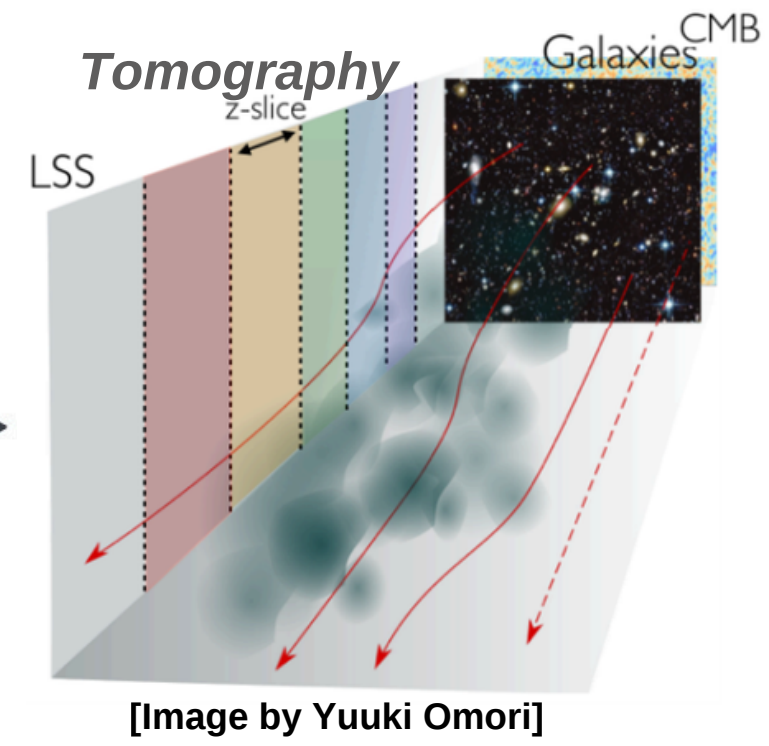
$$\kappa(\hat{n}) = \frac{1}{2} \nabla_{\perp}^2 \phi_L(\hat{n})$$

$$\kappa(\hat{n}) = \int_0^{\chi^*} d\chi' \tilde{W}^{\kappa}(\chi') \delta_m(\chi' \hat{n}, \chi')$$

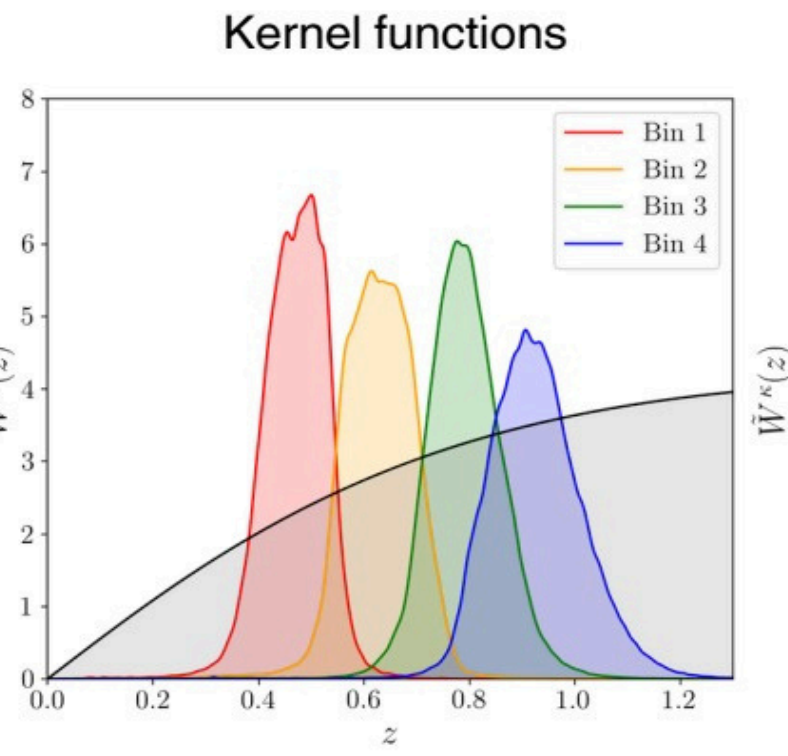
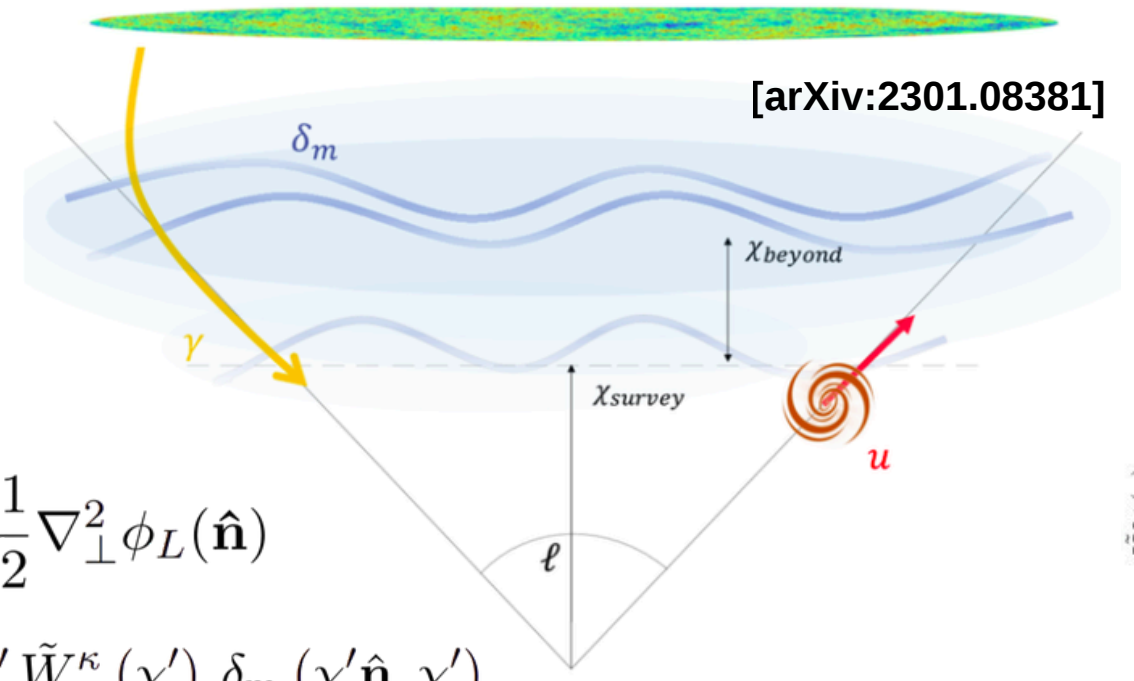
Planck lensing convergence map



DESI-LRGs galaxy density maps



$$\delta_g(\hat{n}) = \int d\chi' \tilde{W}^g(\chi') b(z') \delta_m(\chi' \hat{n}, \chi')$$



$$\langle \kappa_{\ell m} \delta_{g, \ell' m'}^* \rangle = C_{\ell}^{\kappa g} \delta_{\ell \ell'} \delta_{m m'}$$

$$\langle \delta_m(\mathbf{k}, z) \delta_m^*(\mathbf{k}', z') \rangle = (2\pi)^3 \delta_D(\mathbf{k} - \mathbf{k}') \delta_D(z - z') P_m(k, z)$$

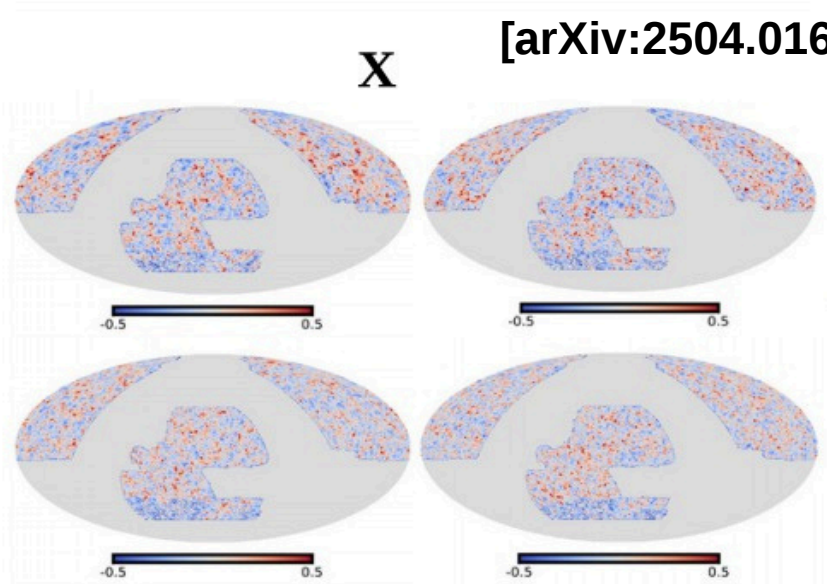
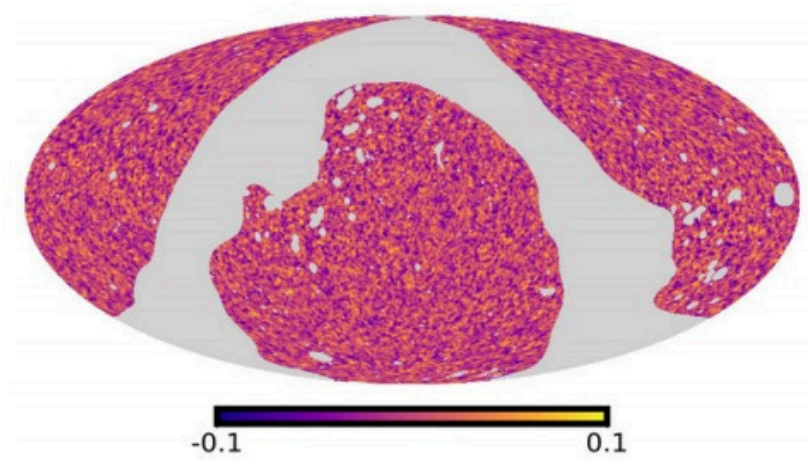
$$C_{\ell}^{XY} = \int dz \frac{H(z)}{c} \frac{W^X(z) W^Y(z)}{\chi^2} P_{XY} \left(k = \frac{(\ell + 1/2)}{\chi}; z \right)$$

*Angular cross-spectrum for two cosmological tracers, X and Y

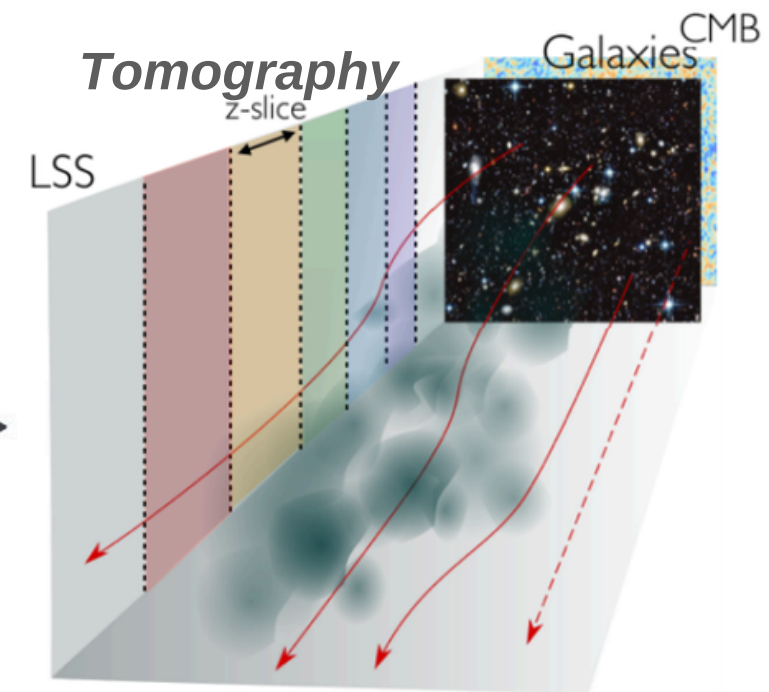
$$\kappa(\hat{\mathbf{n}}) = \frac{1}{2} \nabla_{\perp}^2 \phi_L(\hat{\mathbf{n}})$$

$$\kappa(\hat{\mathbf{n}}) = \int_0^{\chi^*} d\chi' \tilde{W}^{\kappa}(\chi') \delta_m(\chi' \hat{\mathbf{n}}, \chi')$$

Planck lensing convergence map

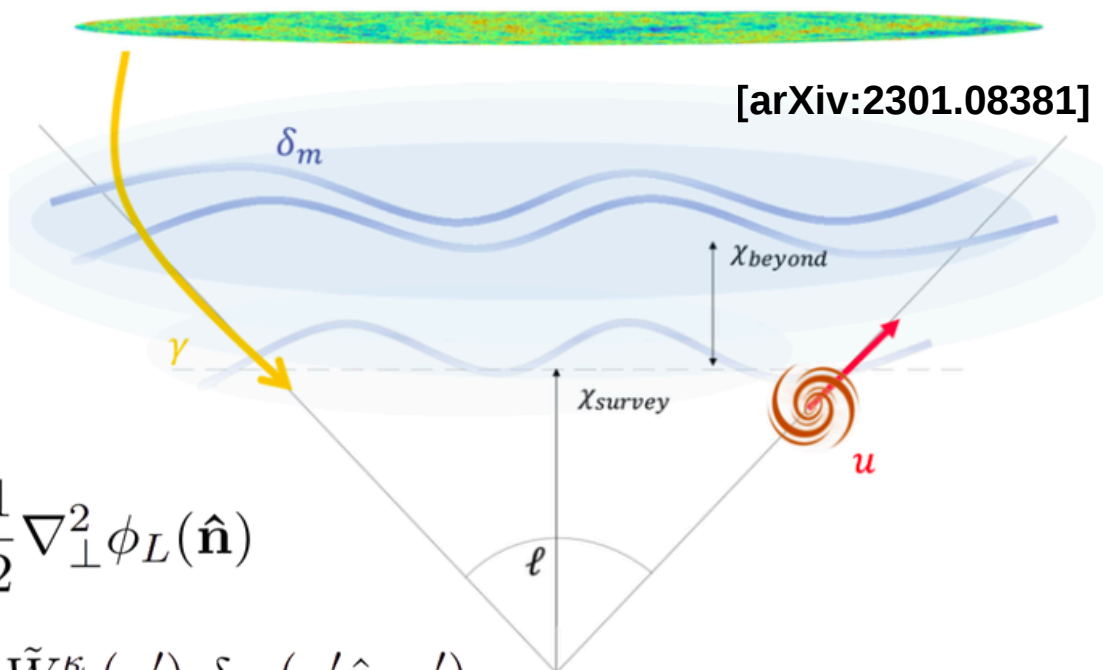


DESI-LRGs galaxy density maps



[Image by Yuuki Omori]

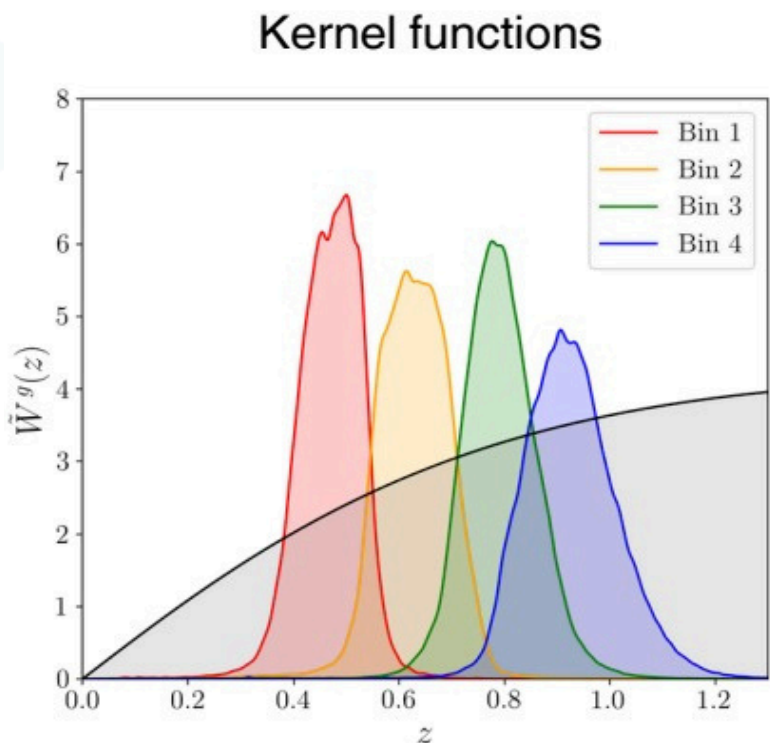
$$\delta_g(\hat{\mathbf{n}}) = \int d\chi' \tilde{W}^g(\chi') b(z') \delta_m(\chi' \hat{\mathbf{n}}, \chi')$$



$$\kappa(\hat{n}) = \frac{1}{2} \nabla_{\perp}^2 \phi_L(\hat{n})$$

$$\kappa(\hat{n}) = \int_0^{\chi^*} d\chi' \tilde{W}^{\kappa}(\chi') \delta_m(\chi' \hat{n}, \chi')$$

Planck lensing convergence map

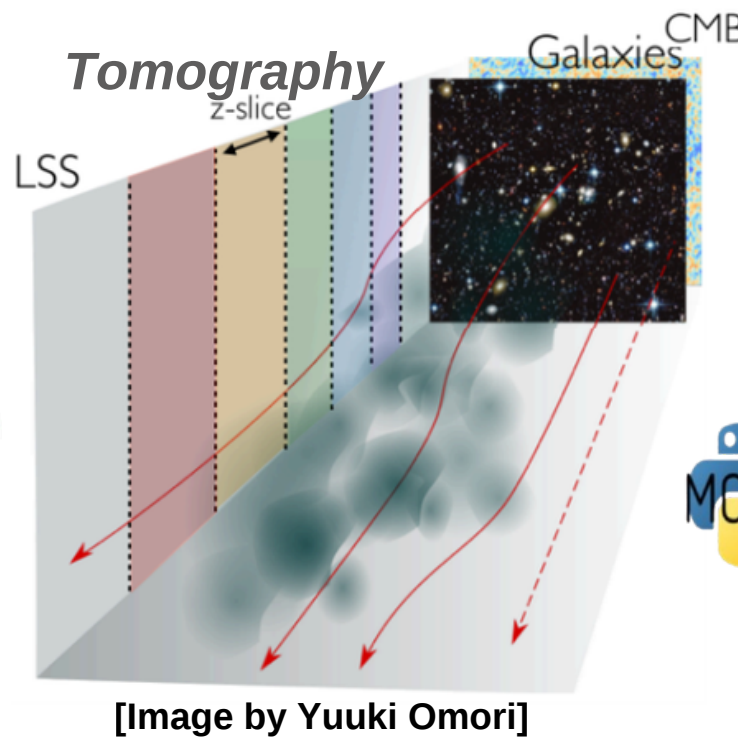
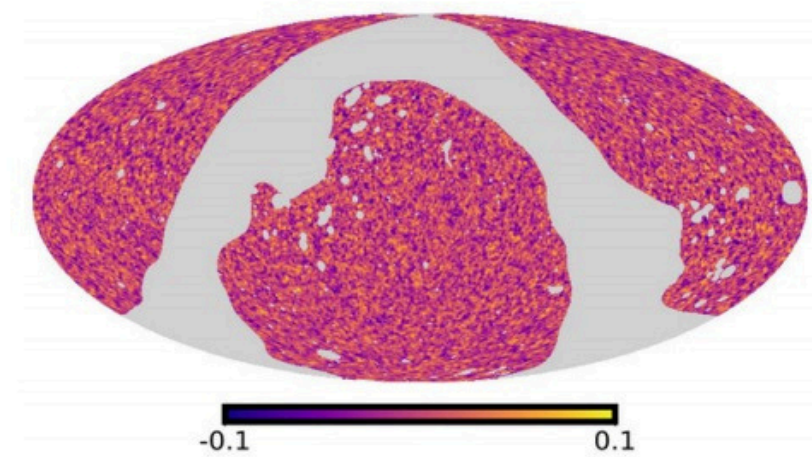


$$\langle \kappa_{\ell m} \delta_{g, \ell' m'}^* \rangle = C_{\ell}^{\kappa g} \delta_{\ell \ell'} \delta_{m m'}$$

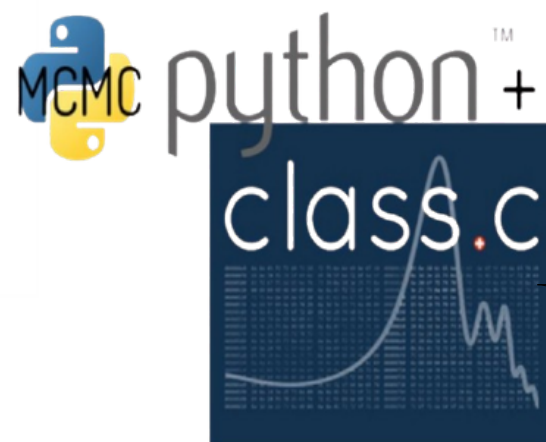
$$\langle \delta_m(\mathbf{k}, z) \delta_m^*(\mathbf{k}', z') \rangle = (2\pi)^3 \delta_D(\mathbf{k} - \mathbf{k}') \delta_D(z - z') P_m(k, z)$$

$$C_{\ell}^{XY} = \int dz \frac{H(z)}{c} \frac{W^X(z) W^Y(z)}{\chi^2} P_{XY} \left(k = \frac{(\ell + 1/2)}{\chi}; z \right)$$

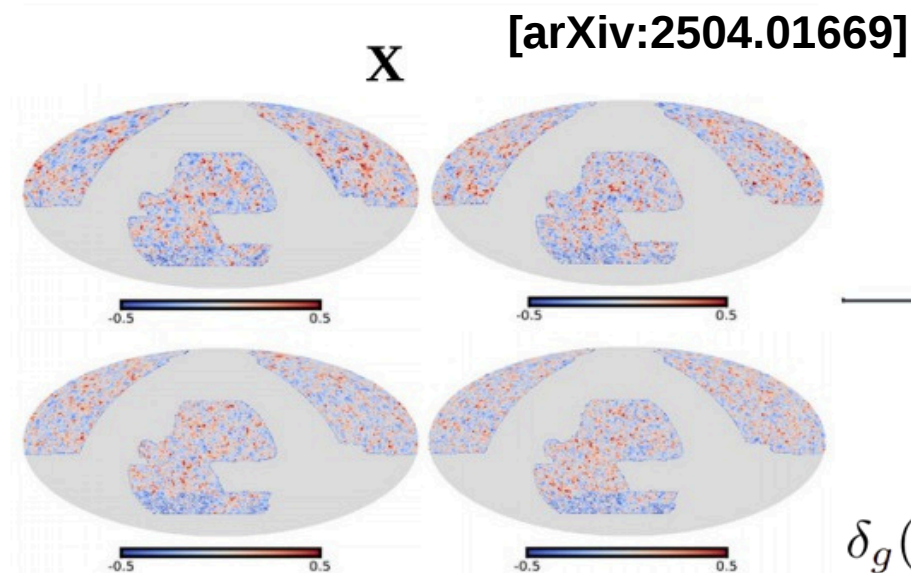
*Angular cross-spectrum for two cosmological tracers, X and Y



Adding effective theories to treat the nonlinear part of P(k)

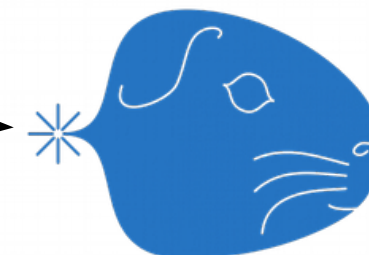


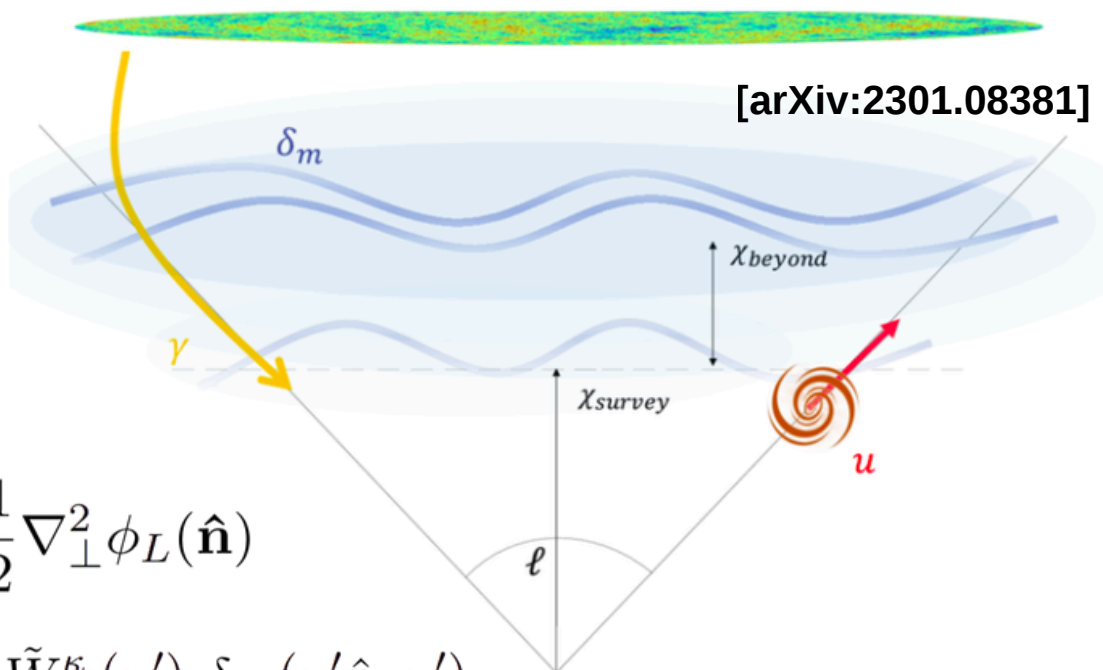
Emanuelly Silva



$$\delta_g(\hat{n}) = \int d\chi' \tilde{W}^g(\chi') b(z') \delta_m(\chi' \hat{n}, \chi')$$

DESI-LRGs galaxy density maps



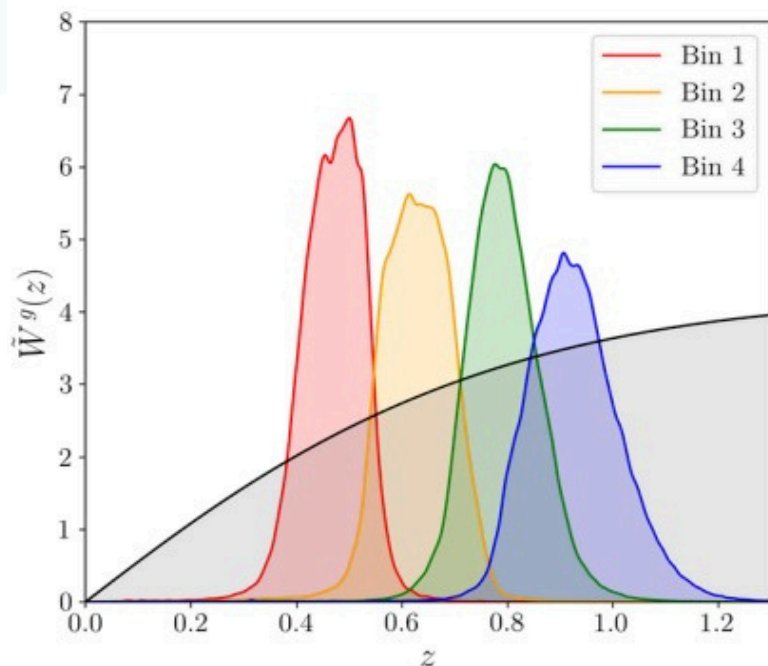


$$\kappa(\hat{\mathbf{n}}) = \frac{1}{2} \nabla_{\perp}^2 \phi_L(\hat{\mathbf{n}})$$

$$\kappa(\hat{\mathbf{n}}) = \int_0^{\chi^*} d\chi' \tilde{W}^{\kappa}(\chi') \delta_m(\chi' \hat{\mathbf{n}}, \chi')$$

Planck lensing convergence map

Kernel functions

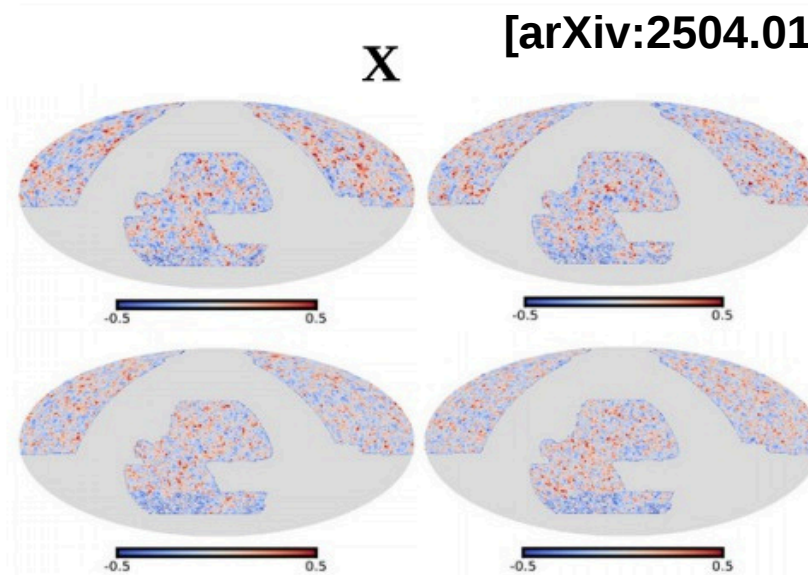
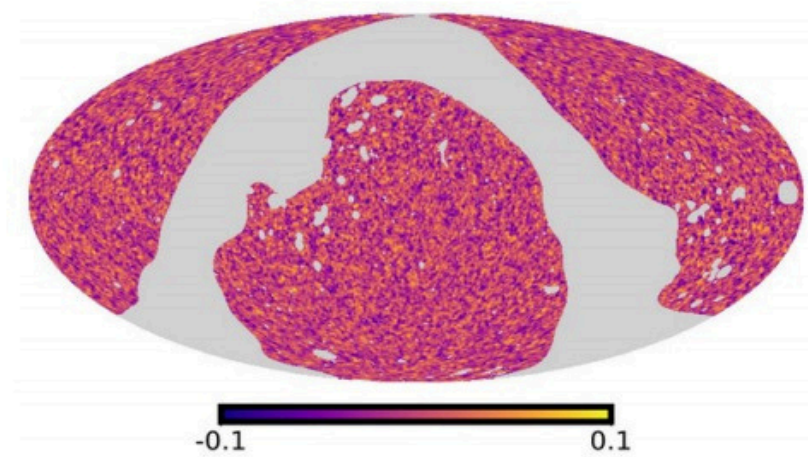


$$\langle \kappa_{\ell m} \delta_{g, \ell' m'}^* \rangle = C_{\ell}^{\kappa g} \delta_{\ell \ell'} \delta_{m m'}$$

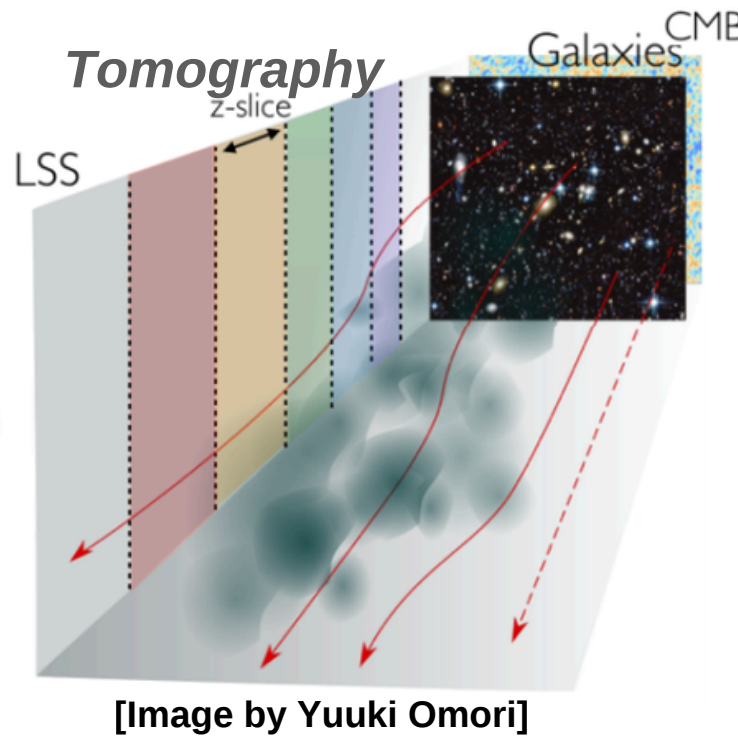
$$\langle \delta_m(\mathbf{k}, z) \delta_m^*(\mathbf{k}', z') \rangle = (2\pi)^3 \delta_D(\mathbf{k} - \mathbf{k}') \delta_D(z - z') P_m(k, z)$$

$$C_{\ell}^{XY} = \int dz \frac{H(z)}{c} \frac{W^X(z) W^Y(z)}{\chi^2} P_{XY} \left(k = \frac{(\ell + 1/2)}{\chi}; z \right)$$

*Angular cross-spectrum for two cosmological tracers, X and Y



DESI-IRGs galaxy density maps



$$\delta_g(\hat{\mathbf{n}}) = \int d\chi' \tilde{W}^g(\chi') b(z') \delta_m(\chi' \hat{\mathbf{n}}, \chi')$$

