MNRAS 000, 1–?? (2018) Preprint 21 March 2018 Compiled using MNRAS LATEX style file v3.0

Sukhdeep Singh[1,2]*,
[1] Berkeley Center for Cosmological Physics, Department of Physics, University of California, Berkeley, CA 94720, USA
[2] Lawrence Berkeley National Laboratory (LBNL), Physics Division, Berkeley, CA 94720-8153, USA

Accepted XXX. Received YYY; in original form ZZZ

ABSTRACT

Key words: cosmology: observations — large-scale structure of Universe — gravitational lensing: weak

* E-mail: sukhdeep1@berkeley.edu

© 2018 The Authors

1 COSMIC SHEAR

1.1 Power spectra

We compute the shear cross correlation between 2 tomographic bins as

$$C_\ell^{ij} = \langle \gamma_i \gamma_j^* \rangle = \frac{1}{N} \int dz_{p_i} p(z_{p_i}) \int dz_{s_i} p(z_{s_i}|z_{p_i}) \mathcal{W}(z_{p_i}, z_{s_i}) \int dz_{p_j} p(z_{p_j}) \int dz_{s_j} p(z_{s_j}|z_{p_j}) \mathcal{W}(z_{p_j}, z_{s_j}) \int dz_l \frac{c}{H(z_l)} \frac{\overline{\rho}_m}{\Sigma_c(z_l, z_{s_i})} \frac{\overline{\rho}_m}{\Sigma_c(z_l, z_{s_j})} \frac{1}{f_k(\chi_l)^2} P_{mm}(z_l) \quad (1)$$

$$N = \int dz_{p_i} p(z_{p_i}) \int dz_{s_i} p(z_{s_i}|z_{p_i}) \mathcal{W}(z_{p_i}, z_{s_i}) \int dz_{p_j} p(z_{p_j}) \int dz_{s_j} p(z_{s_j}|z_{p_j}) \mathcal{W}(z_{p_j}, z_{s_j}) \quad (2)$$

Our notation is slightly different from many lensing papers. z_{p_i} denotes the photo-z distribution for sample i, z_{s_i} denotes the true redshift for these source galaxies. $p(z_{p_i})$ is the photometric redshift distribution for these galaxies and $p(z_{s_i}|z_{p_i})$ is the distribution of true redshift for galaxies with photo-z z_{p_i}. We will use subscript l to denote quantities related to the matter (such as z_l) that is lensing the source galaxies. We use $d\chi_l = dz_l \frac{c}{H(z_l)}$, lensing weight $W_L = \frac{\overline{\rho}_m}{\Sigma_c(z_l, z_{s_2}) f_k(\chi_l)}$ where $f_k(\chi_l)$ is the transverse separation to redshift z_l. $P_{mm}(z_l)$ is the matter power spectrum at redshift z_l. We use the normalization factor N to correctly normalize the computed power spectra. $\mathcal{W}(z_{p_i}, z_{s_i})$ are the weights that are applied to the source galaxies.

SS: In the code, we assume that z_{p_i} is the true redshift for now and hence there is not integral over dz_{s_i}