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A direct measurement of tomographic lensing power spectra from CFHTLenS

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We measure the weak gravitational lensing shear power spectra and their cross-power in two photometric redshift bins from the Canada-France-Hawaii Telescope Lensing Survey (CFHTLenS). The measurements are performed directly in multipole space in terms of adjustable band powers. For the extraction of the band powers from the data we have implemented and extended a quadratic estimator, a maximum likelihood method that allows us to readily take into account irregular survey geometries, masks, and varying sampling densities. We find the 68 per cent credible intervals in the σ_8–$\Omega_{\rm m}$-plane to be marginally consistent with results from $Planck$ for a simple five parameter ΛCDM model. For the projected parameter $S_8 \equiv \sigma_8(\Omega_{\rm m}/0.3)^{0.5}$ we obtain a best-fitting value of $S_8 = 0.768^{+0.045}_{-0.039}$. This constraint is consistent with results from other CFHTLenS studies as well as the Dark Energy Survey. Our most conservative model, including modifications to the power spectrum due to baryon feedback and marginalization over photometric redshift errors, yields an upper limit on the total mass of three degenerate massive neutrinos of $\Sigma m_\nu < 4.53\,{\rm eV}$ at 95 per cent credibility, while a Bayesian model comparison does not favour any model extension beyond a simple five parameter ΛCDM model. Combining the shear likelihood with $Planck$ breaks the σ_8–$\Omega_{\rm m}$-degeneracy and yields $\sigma_8 = 0.817^{+0.013}_{-0.014}$ and $\Omega_{\rm m} = 0.298 \pm 0.011$ which is fully consistent with results from $Planck$ alone.

Author: KÖHLINGER, Fabian

Co-authors: Dr JOACHIMI, Benjamin (University College London); Dr HOEKSTRA, Henk (Leiden Observatory); Prof. KUIJKEN, Konrad (Leiden Observatory); Dr VIOLA, Massimo (Leiden Observatory); VALKENBURG, Wessel (Leiden University)

Presenter: KÖHLINGER, Fabian

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