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Emulating galaxy clustering and galaxy-galaxy lensing into the deeply nonlinear regime

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We model galaxy-galaxy lensing and clustering into nonlinear scales with a suite of N-body simulations, and we project significantly tighter cosmological parameter constraints possible within the ΛCDM parameter space and a HOD galaxy biasing model by using small scales. To include possible assembly bias effects, we introduce a two-halo environmental density dependence parameter into our model and show that fully-marginalized cosmological constraints should improve by greater than a factor of two using scales $0.5 < r_p < 30$ Mpc h^{-1} compared to using only scales > 5 Mpc h^{-1}. We forecast that combining clustering information from the BOSS LOWZ sample and galaxy-galaxy lensing from SDSS imaging can constrain the combined cosmological parameter $\sigma_8 \Omega_M^{0.3}$ to 2.4 per cent, and full-depth DES imaging may improve this constraint to 1 per cent (assuming 10 galaxies per square arcminute).

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