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Intrinsic Shear and Galaxy Alignments: A Quantitative Study Using the TATT model

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Abstract : The intrinsic alignment (IA) of galaxies acts as a systematic effect in weak lensing measurements and tends to introduce biases. It mimics the gravitational lensing signal which makes it difficult to distinguish it from the true gravitational weak lensing effect. Hence, it is critical to account for the noise for correctly interpreting the results. This study aims at a quantitative analysis of IA using the Tidal Alignment and Tidal Torquing (TATT) model. We also investigate how the signals for shear and galaxy-galaxy lensing behave upon changing the parameters of the TATT model. The data for this study was prepared with a computational pipeline based on the Cocoa model to explore the parameter space of the intrinsic shape signal. Through this work, we identify that linear terms of the intrinsic shape signal are dominant in the case of GGL while the higher-order terms dictate the shear signal.

Keywords: Intrinsic Alignments, Weak Gravitational Lensing, Tidal Alignment, Tidal Torquing, Cosmic Shear, Galaxy Alignments