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A new pairwise estimator for the y -type polarised kinetic Sunyaev Zeldovich effect from galaxy clusters

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We introduce a new pairwise estimator for observing the polarised kinetic Sunyaev Zeldovich (pkSZ) effect arising from the transverse peculiar velocity of galaxy clusters. The pkSZ effect is a second-order effect in the peculiar velocities of the clusters and has a frequency spectrum that can be decomposed into y -type and blackbody components, whereas the unpolarised linear kSZ effect has a blackbody spectrum only. Thus the detectability of the pkSZ effect depends only on the sensitivity of the survey and not on other primary and secondary CMB anisotropies. We present a theoretical expectation of the estimator of the pairwise pkSZ effect and calculate the signal for different mock cluster catalogues. We also make a forecast for CMB-S4. If detected, the pairwise pkSZ effect will open up a new window into the study of the large-scale structure of the Universe.

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