

## Supplementary Material:

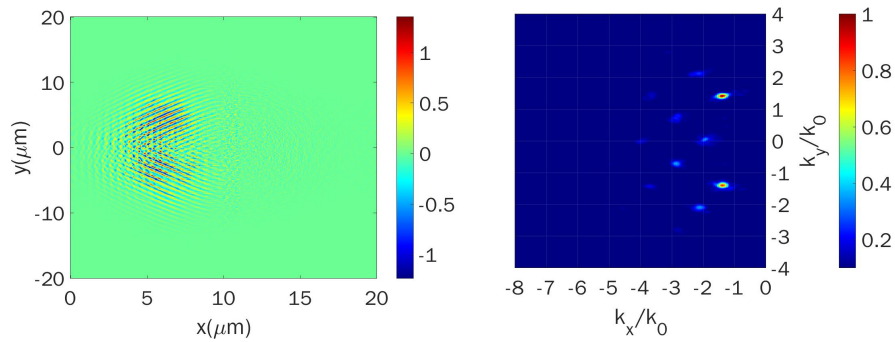


Figure S1. Electric field ( $E_z$ ) distribution of the harmonics and its corresponding spectrum distribution in  $k$ -space in the case of two same-rotation CP lasers, where the fundamental components are filtered out.

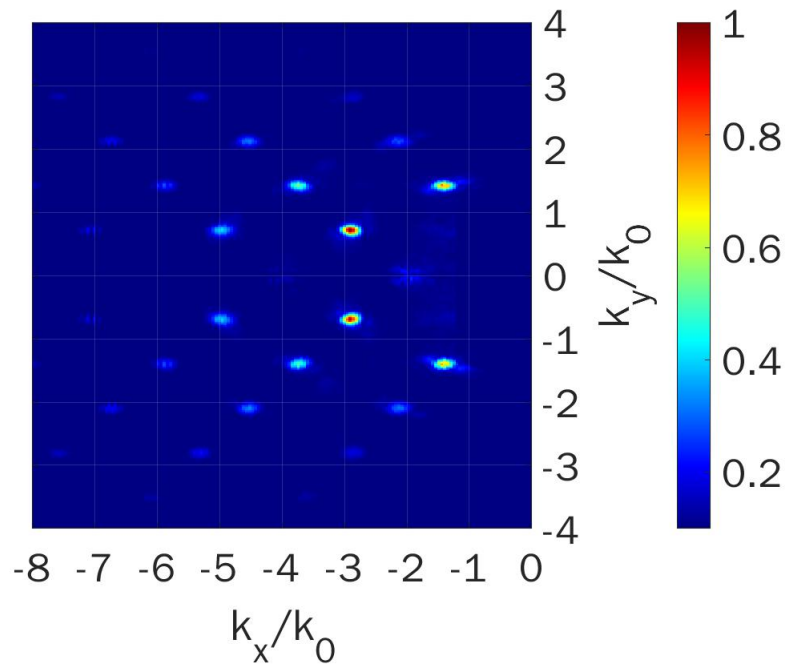


Figure S2. The harmonic spectrum distribution of  $E_y$  in  $k$ -space, where the even harmonics in the normal direction are missing, as compared with that shown in Fig. 3.

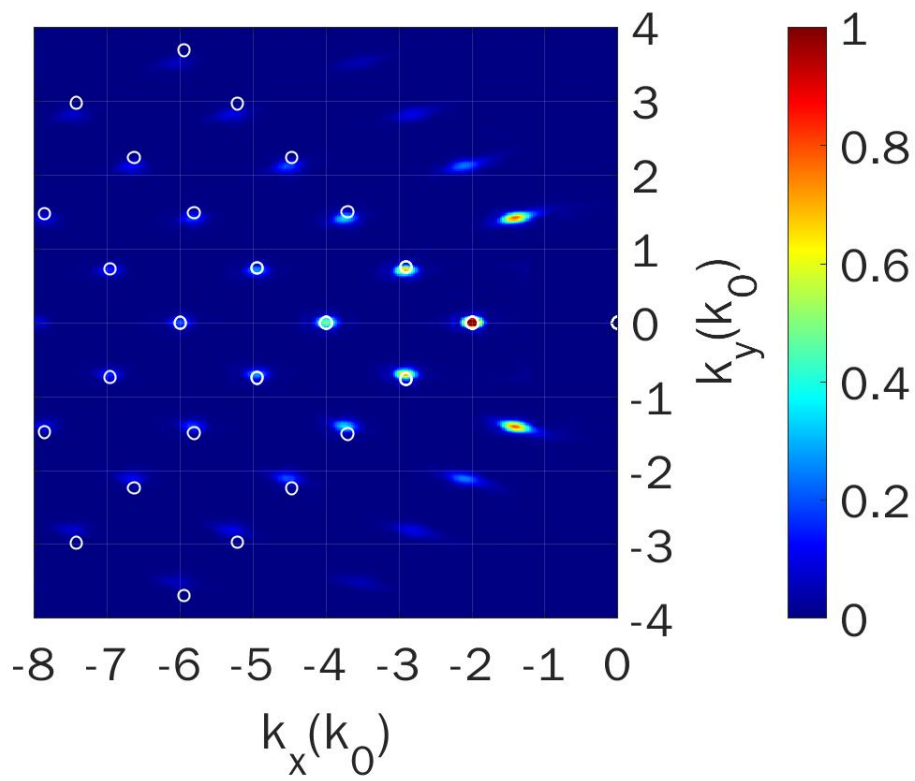


Figure S3. The  $k$ -spectrum distribution of the harmonics where the fundamental components are filtered out for the counter-ratation CP lasers in the 2D simulation. In this case,  $10000 \times 10000$  grids is used for the  $x \times y$  window. It turns out that there is no difference for the lower order harmonics.