



Fig. S1 Measurement process of 1D moiré phases when one or more principal directions of a grid image are away from the horizontal or vertical direction: (a) grid image, (b) grid image after rotation such that at least one of the principal directions is close to the horizontal or vertical direction, (c) and (d) principal gratings in r_1 and r_2 directions, respectively, (e) and (f) moiré phases in r_1 and r_2 directions, respectively, (g) and (h) moiré phase maps after being rotated back to the same orientation as the original grid image, and (i) and (j) moiré phase maps after cropping the image to the same size as the original grid image.