

## Supporting Information of manuscript CP-ART-09-2023-004473

### Chiral nanoparticles separation and discrimination by radially polarized circular Airy vortex beams with orbital-induced spin angular momentum

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#### 1. Transverse optical forces acting on chiral particles across various longitudinal planes of the RPCAVB

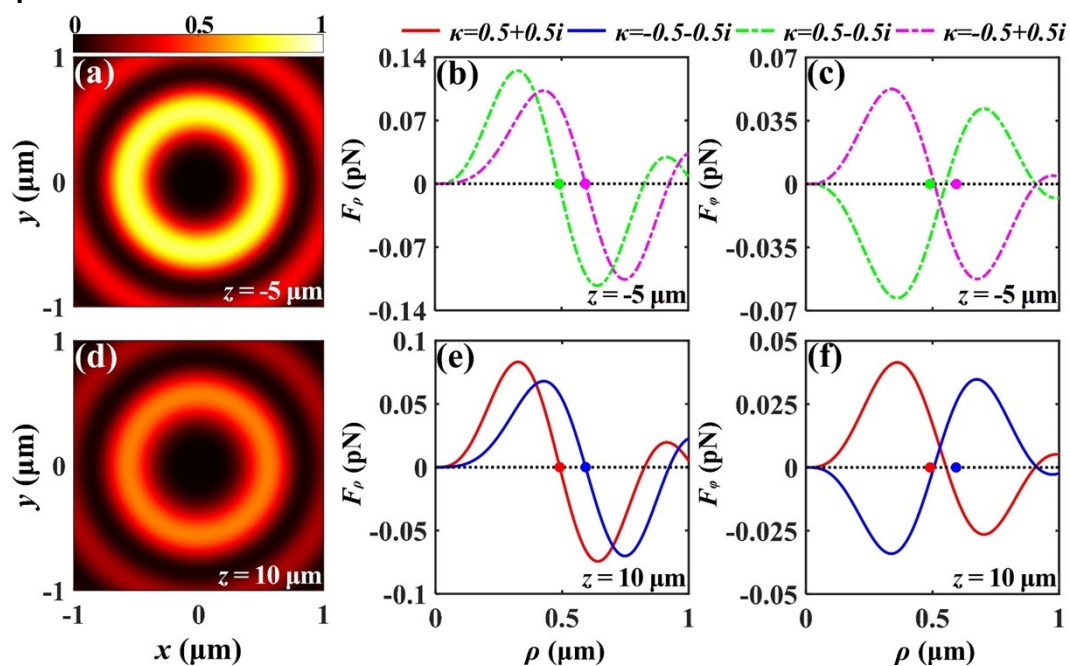


Fig. S1. (a,d) Transverse intensity profiles of the tightly focused RPCAVB with  $l=3$  on different longitudinal planes. (b,e) Radial and (c,f) azimuthal optical forces exerted by the RPCAVB on two groups of opposite enantiomers on different longitudinal planes. Red, blue, green and magenta dots represent the radial trapping positions of the chiral particles with  $\kappa = 0.5 + 0.5i$ ,  $\kappa = -0.5 - 0.5i$ ,  $\kappa = 0.5 - 0.5i$  and  $\kappa = -0.5 + 0.5i$ , respectively. Panels (a) and (d) are normalized by the RPCAVB's maximum intensity value on the focal plane.

## 2. Azimuthal optical forces exerted by RPCAVBs with opposite topological charges on chiral particles

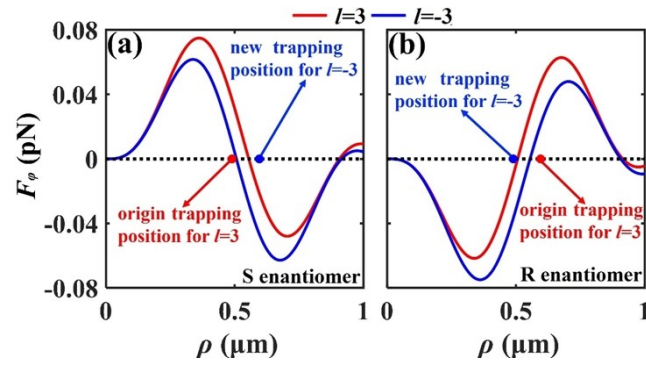


Fig. S2. Azimuthal optical forces along the radial direction for S and R enantiomers immersed in tightly focused RPCAVBs with  $l = \pm 3$ .