

Super-resolution focused light spots are always expected in scanning optical microscopy. There are bright focused light spots and dark focused spots in stimulated emission depletion (STED) microscopy. The latter dark spot is normally generated by focusing a linearly polarized beam with spiral phase. In this work, we generated a super-resolution optical tube by tightly focusing a binary phase modulated azimuthally polarized laser beam. The binary phase modulation is achieved by a glass substrate with multi-belt concentric ring grooves. We also characterized the 3D beam profile by using a cross-shaped knife-edge fabricated on a silicon photo-detector. The size of the super-resolution dark spot in the tube is  $0.32\lambda$ , which remains unchanged for  $\sim 4\lambda$  within the tube. This optical tube may find applications in super-resolution microscopy, optical trapping and particle acceleration.