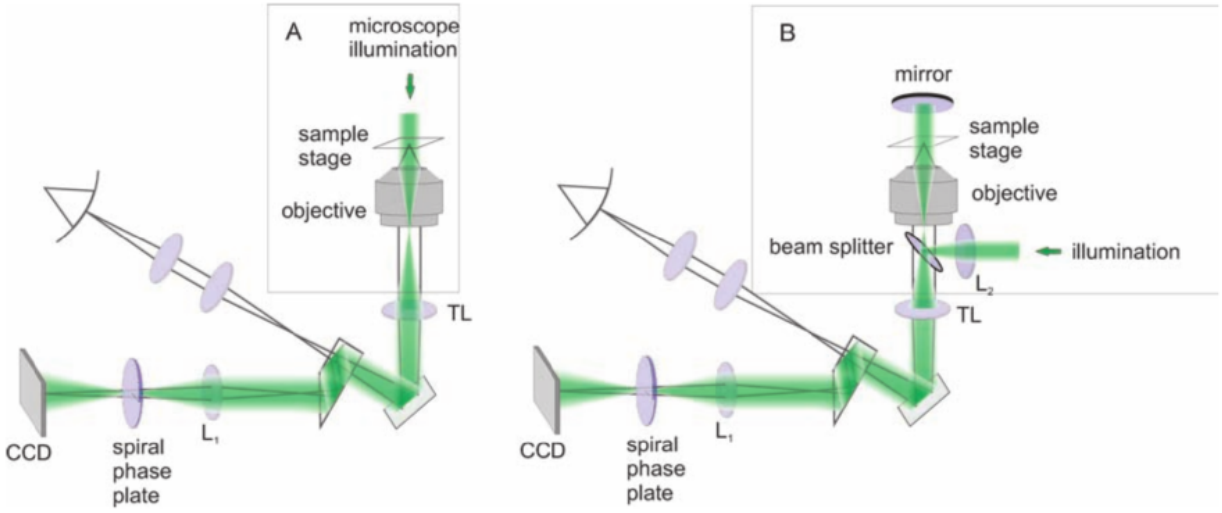
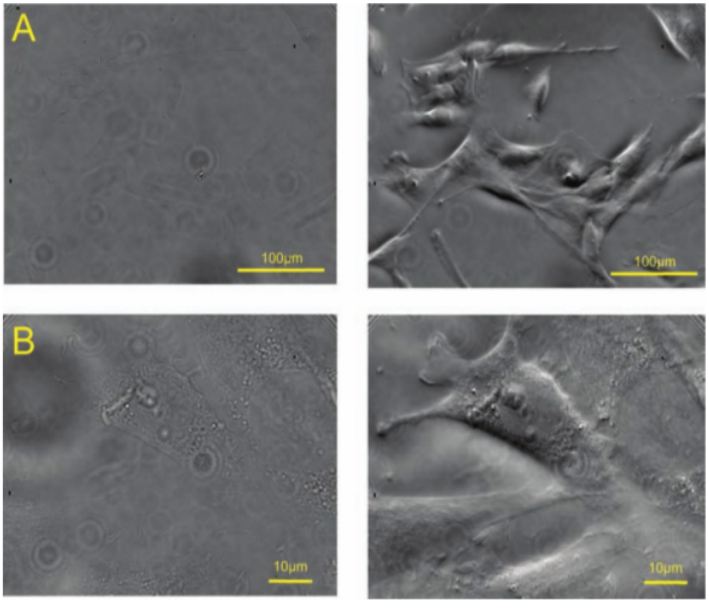


Fig. 2. The light path modifications used for spiral filtering. Graphic A shows the set-up for transmissive probes, set-up B is for reflective probes with epi-illumination. The optical path after the tubus lens (TL $f = 160$ mm) is the same for both set-ups. The spiral phase plate is inserted into the Fourier plane of the horizontal front port of the microscope. The distance from the tubus lens to the CCD is approximately 370 mm, and the lens L_1 has a focal length of 50 mm. In the case of a transmissive probe (set-up A) the illumination aperture has to be chosen rather small (NA = 0.03 in our experiments). In the case of a reflective set-up (B), a beam splitter and an additional lens L_2 ($f = 100$ mm) have to be placed into the optical path of the microscope. The lens L_2 focuses the input beam to the Fourier plane of the objective. The collimated light leaving the objective is either reflected by the probe or, in the case of a transmissive sample, reflected by an additional mirror. Lens L_2 focuses the illumination beam to a spot size of 100 μm to the focal plane of the objective.



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Upgrading a microscope with a spiral phase plate

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Fig. 3. The images show fibroblast cells in line A as viewed with a 20× air objective, in line B recorded with a 100× oil immersions objective. The images at the left side show the bright-field images, whereas at the right are the corresponding spiral phase-filtered images. The centre of the spiral phase plate is placed 50 μm away from the optical axis. The recording time of the spiral phase-filtered images is only half as long as that of the bright-field images.