# Abstract

In this thesis two complementary methods were applied to analyse liquid crystalline director fields in complex geometries. On the experimental side fluorescence confocal polarising microscopy was used, a technique, which allows the visualisation of director fields along various slices through the sample. The experimental results were established by numerical simulations based on the Q-tensor-method. Scientific background of the presented results is given by investigations of the tunability of photonic bandgap materials.

This work focuses on both nematic and cholesteric directorfields, which were analysed in modulated and in unmodulated cylindrical cavities. For nematic liquid crystals a stabilisation of defect rings of half integer strength was observed. They carry a positive sign in the bellies and a negative sign in the waists of the pores. Simulations on basis of the Q-tensor-method confirmed the experimental results.

In case of the cholesteric mixtures the ratio of the adjusted pitch to the pore diameter proved to be the crucial parameter for the resulting director field. When the pitch was smaller than the pore diameter, mostly axially oriented helices were observed. For pitches in the order of the pore diameter it was found that the tendency towards an orthogonal helix orientation increases.