

**Examination to the lecture „Optical Metrology and Sensing“  
winter semester 2010/11**

Zeit: 2h

**Feb. 14th, 2010**

**Last name:** \_\_\_\_\_

**First name:** \_\_\_\_\_

**Date of birth:** \_\_\_\_\_

**Matriculation number:** \_\_\_\_\_

1. Give examples for two interferometers with division of amplitudes and for two interferometers with division of wavefronts (sketches). (8p)
2. Explain the spatial and the temporal coherence. (8p)
3. What does the degree of coherence describe and how does it influence the law of two-beam interference? (6p)
4. Explain the physical meaning of the free spectral range in Fabry-Perot interferometers. How is it defined? Is there a difference with regard to the grating interferometer? (8p)
5. How can white-light interference patterns be generated with a Michelson interferometer? (4p)
6. What is the grating period of the interference pattern, if two plane monochromatic waves interfere within glass under an angle of  $60^\circ$  (wavelength 510nm, refractive index of glass 1.5)? Draw a sketch (4p)
7. Could you explain the work principles of adaptive mirrors? (4p)
8. What is the meaning of optical phase conjugation? How can it be realized experimentally? (6p)
9. Explain the principle of holographic recording and reconstructing of wavefronts (6p)
10. Could you explain the principles of holographic interferometry? (4p)
11. Explain the principles of the wavefront measurement with Hartmann- and Hartmann-Shack sensors. (6p)