european training network on full parallax imaging

# Preliminary programme of Training school 2:
## Optical foundations of Full Parallax Imaging

**Day 1. September 12th, Monday**

*Morning Session (8:30 to 13:00):*
**Fundaments of Geometrical Optics**. Propagation of rays in transparent materials. Refraction of rays in plane and spherical diopters. Image formation with lenses. Combination of lenses. Aperture and field limitation.

*Afternoon Session (15:00 to 18:00):*
**Laboratory experiments.** Refraction through a plane-parallel plate. Total internal reflection. Verification of law of lenses: image position and magnification.

**Day 2. September 13th, Tuesday**

*Morning Session (8:30 to 13:00):*
**Matrix formulation of Geometrical Optics**. The concept of ABCD matrix. Matrix of propagation and of refraction. ABCD matrix between conjugated planes. Transposition of ABCD matrices. ABCD formalism and the lightfield description. Multi-view systems analyzed in terms of ABCD formalism.

*Afternoon Session (15:00 to 18:00):*
**Laboratory experiments.** Implementation of fundamental optical instruments: microscope, telescope, and focimeter. Measurement of magnification and field-limitation in the fundamental optical instruments.

**Day 3. September 14th, Wednesday**

*Morning Session (8:30 to 13:00):*
**Wave theory of image formation**. The plane wave and the spherical wave. The wavefield as linear superposition of spherical waves. Propagation of wavefields though converging lenses. Waves through telecentric optical systems. Image formation analyzed in terms of wave optics: the concepts of PSF, spatial resolution, OTF and frequency cut-off.

*Afternoon Session (15:00 to 18:00):*
**Laboratory experiments.** Light diffracted through periodic screens. Optical filtering of selected frequency content of different 2D objects.

**Day 4 September 15th, Thursday**

*Morning Session (8:30 to 13:00):*
**Wave and ray theory of plenoptic systems**. Capture of lightfield with an array of digital cameras: the synthetic aperture method. Capture of lightfield with a plenoptic camera working in the 1.0 mode. Capture of lightfield with a plenoptic camera working in the 2.0 mode. Algorithms for the calculation of views and for the reconstruction in depth.

*Afternoon Session (15:00 to 18:00):*

**Laboratory experiments.** Implementation of synthetic-aperture setup. Implementation of a plenoptic camera. In both cases the views and the reconstruction in depth will be calculated.