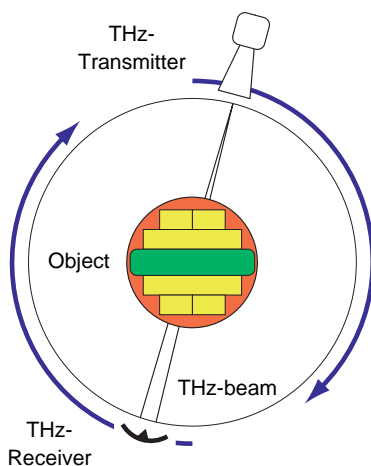




## Master/Bachelor – Thesis:

### THz – Tomography

A tomography system is used to make a 3D model of the interior of a partly transparent object by measuring the transmitted radiation through the object from several angles. In this work, terahertz tomography is to be performed using a separate transmitter and receiver, each implemented as a silicon chip. As a proof of concept, terahertz tomography has been performed of a small plastic hollow body (see illustration on the right side) in our institute. Scanning of larger objects will, however, require a redesign and improvement of the complete tomography system.



In the transmission imaging mode, it is necessary to move the available single-pixel detector or receiver around the object synchronously with the THz transmitter. Alternatively, the object can be rotated and moved in a fixed THz imaging setup. In the sketch to the left, the purpose of the system is to image the green embedded object. A 3D model of this object can be obtained through a mathematical transformation of transmission-mode images taken from different angles. In a graphical user interface (GUI) it should be possible to view the 3D model of the object from different directions. In addition, it should be possible to select and view an arbitrary 2D cut of the object in order to be able to measure the dimensions of the embedded objects.

Your task would be to design the hardware- and software-based control of the entire system, including the computer-controlled positioning system, and to develop the software for generating a layer-by-layer representation or a 3D model of the imaging object. The proposed tomography system has not yet implemented, but should be developed in a joint project with the Department of Mechanical Engineering (FB D) (Department of Design).

Requirements: **Circuit and PCB design, soldering, programming, and use of data acquisition cards. Matlab and English-language skills are an advantage**

After successful finishing the project you have good possibilities to work in the field of:  
signal processing, data acquisition, robotics

Contact: Prof. Dr. Ullrich Pfeiffer or Dipl.-Ing. Hans M. Keller  
Tel.: 0202 439 – 1451 or – 1995  
e-mail: [ullrich.pfeiffer@uni-wuppertal.de](mailto:ullrich.pfeiffer@uni-wuppertal.de) or [keller2@uni-wuppertal.de](mailto:keller2@uni-wuppertal.de)