

# THz R&D at DLR's Institute of Optical Sensor Systems

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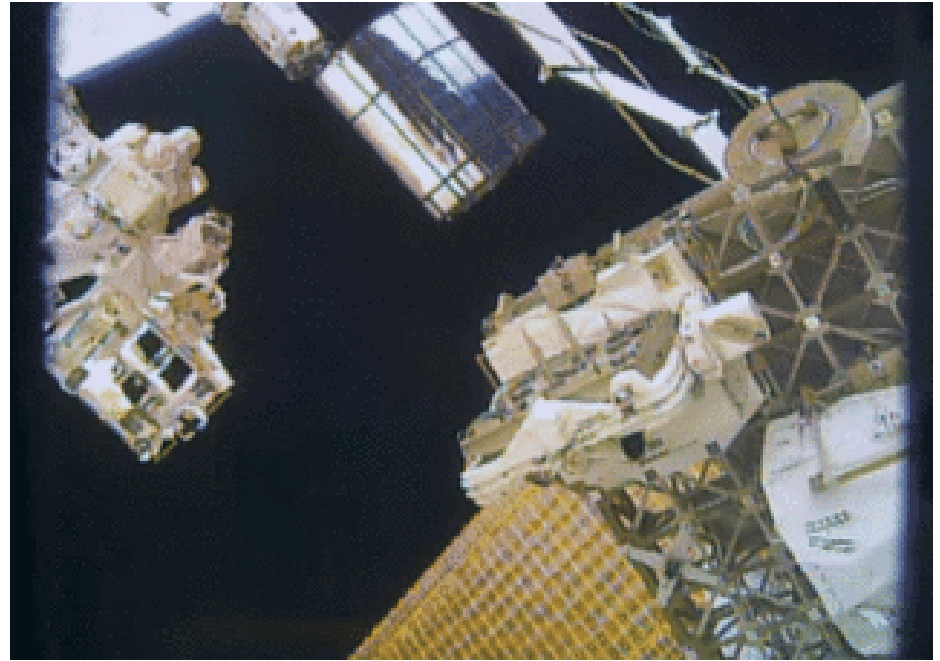


Knowledge for Tomorrow



# Institute of Optical Sensor Systems

- Mission:  
Research and development of optical sensor systems (UV, VIS, IR, THz) in analogy and extension of the human visual perception.
- Research areas:
  - focal planes and camera systems
  - spectrometers
  - Modelling & data products
- Applications:
  - Earth observation
  - Planetary research
  - Security
  - Transport

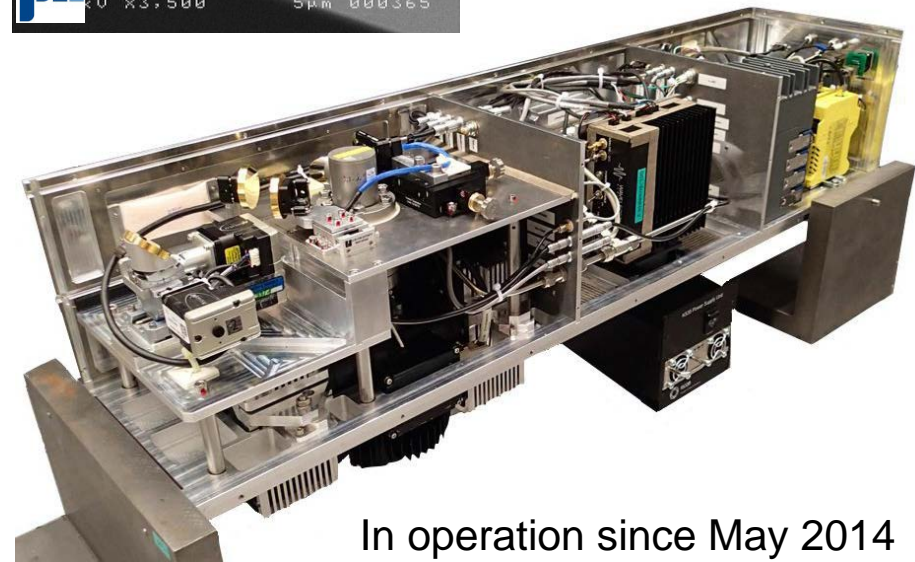
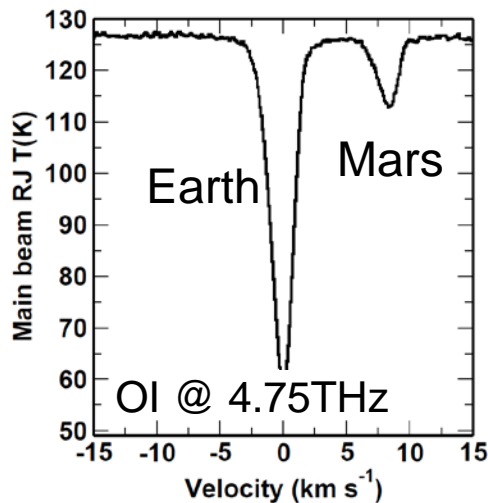
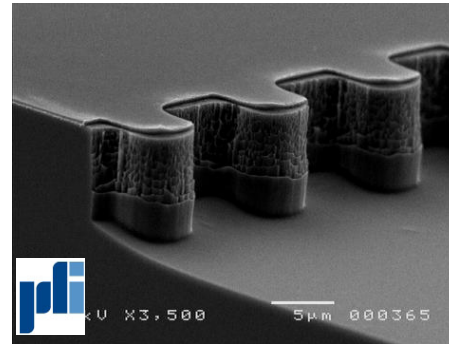


## THz R&D @ DLR:

- Earth observation
- Planetary research/astronomy
- Security



# THz QCLs for high resolution spectroscopy: Astronomy and atmospheric science



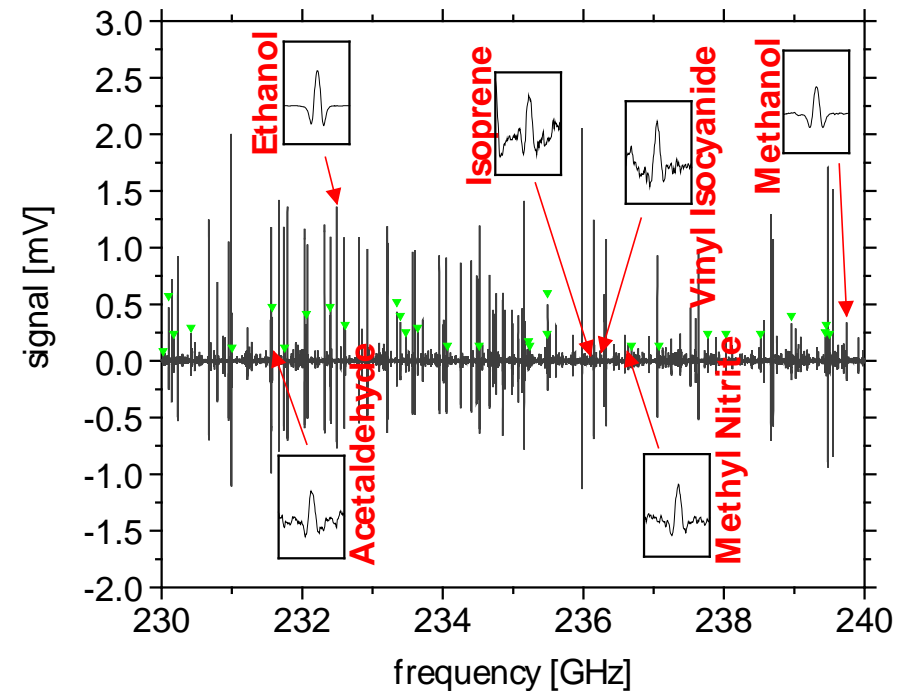
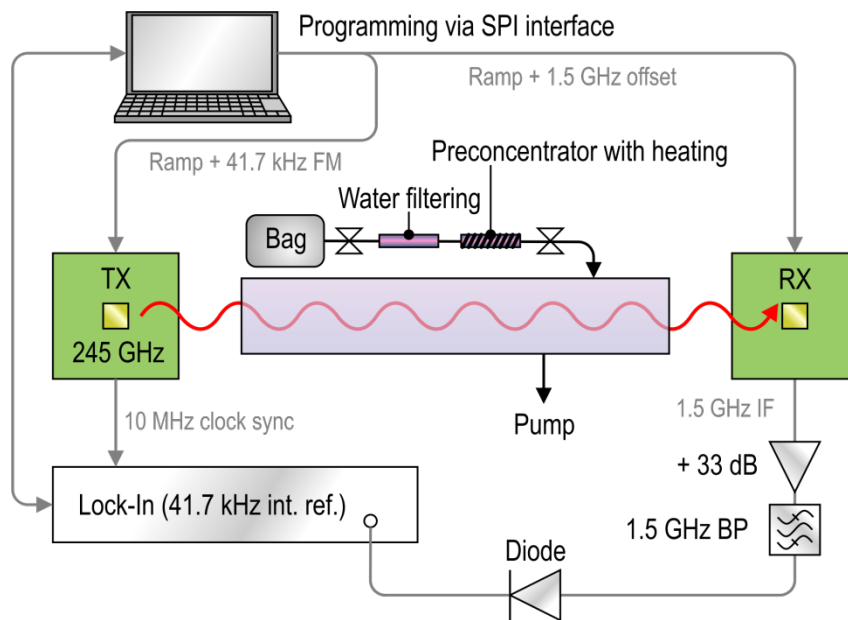
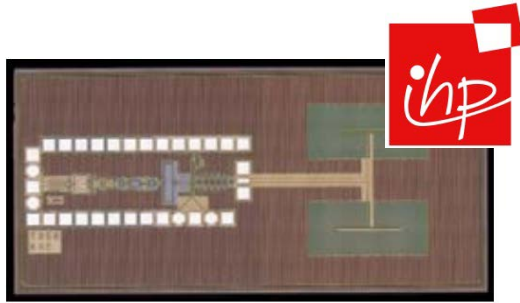
In operation since May 2014  
38 successful flights (~350 hours)

L. Rezac et al., Astron. & Astrophys. 580, L10 (2015)

H. Richter et al., IEEE THz Sci. Technol., 5, 539 (2015)



# THz spectroscopy: Volatile organic compounds



## Objectives:

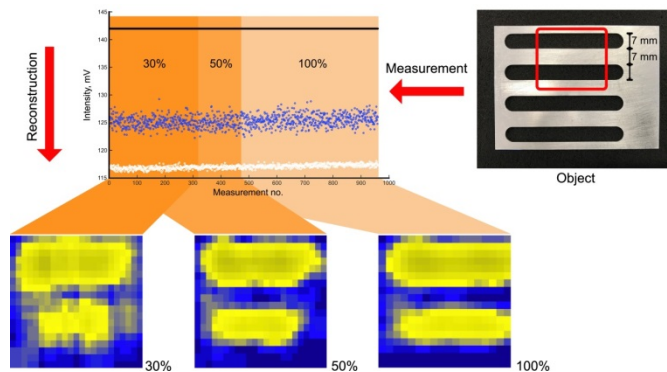
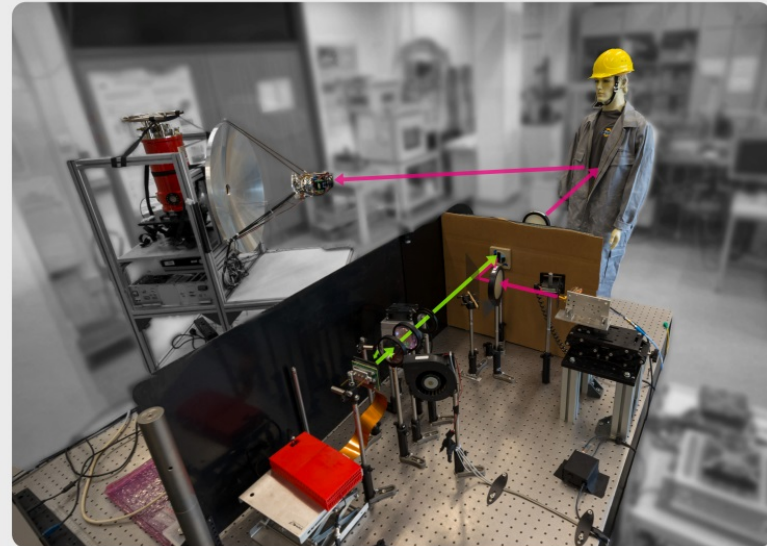
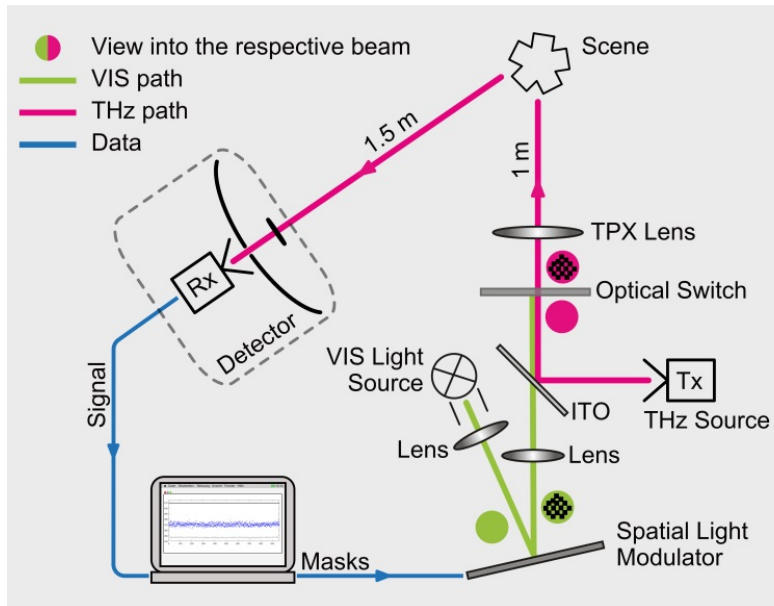
- Detection of VOCs in breath
- Detection of toxic (industrial) chemicals

N. Rothbart, IEEE Sensors Journal **16**, 8863 (2016)

K. Schmalz et al., IEEE TST **65**, 1807 (2017)



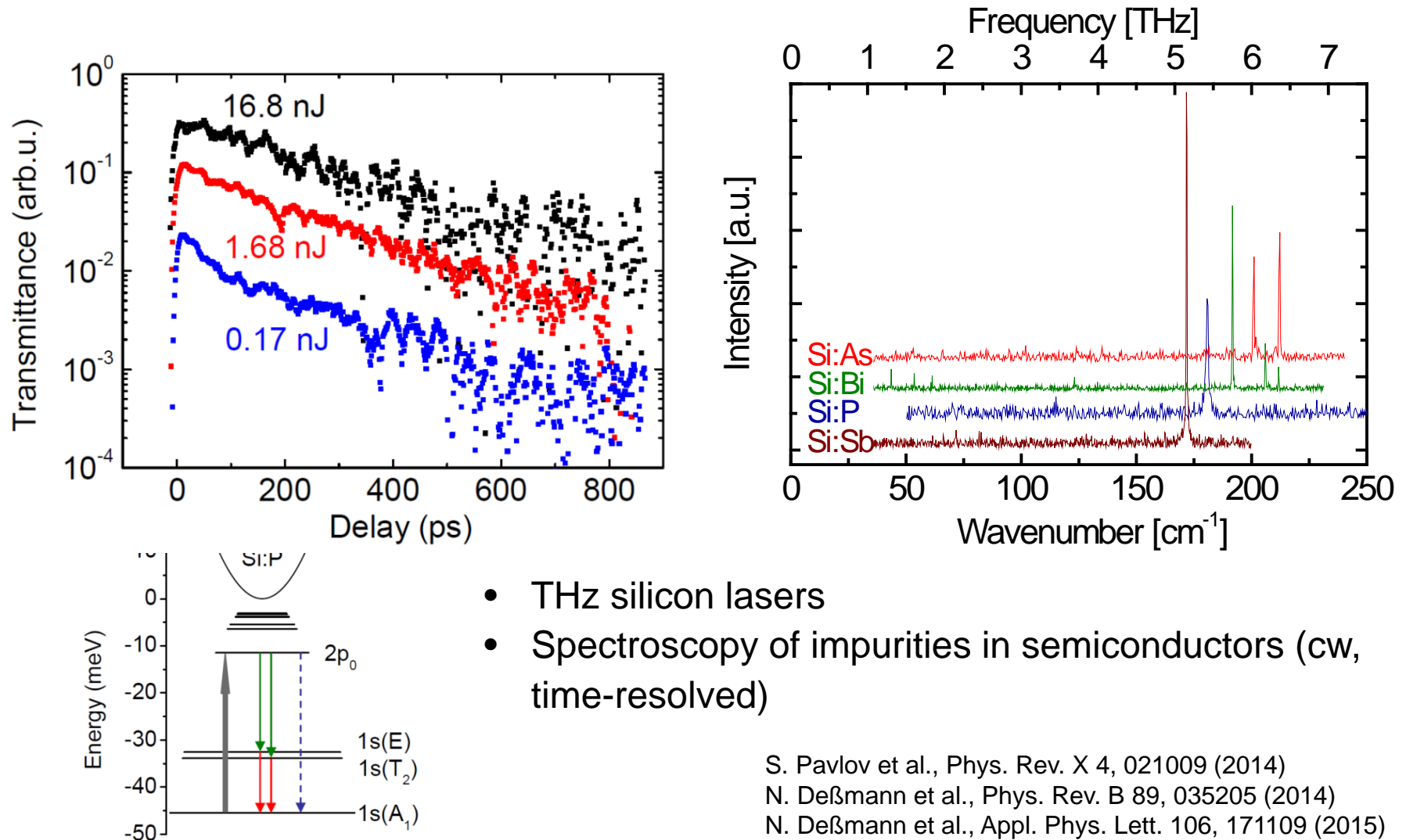
# THz imaging with single pixel camera and CS



S. Augustin, Sci. Reports **3**, 97 (2018)



# THz semiconductor spectroscopy



S. Pavlov et al., Phys. Rev. X 4, 021009 (2014)  
 N. Deßmann et al., Phys. Rev. B 89, 035205 (2014)  
 N. Deßmann et al., Appl. Phys. Lett. 106, 171109 (2015)