



**attocube**

WITTENSTEIN group

new benchmark for  
Raman microscopy



# cryoRaman

cryogenic Raman microscope

**CRYOGENIC INSTRUMENTS**

cool tools for cold science

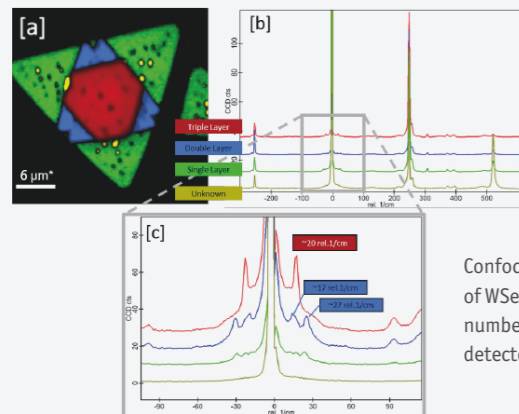
# Selected Measurements

performed with the cryoRaman microscope

# Confocal Raman Microscope

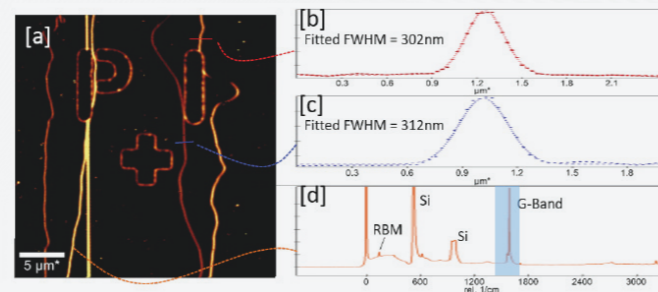
for cryogenic temperatures & high magnetic fields

## High-resolution Raman imaging on WSe<sub>2</sub>



Confocal Raman image of WSe<sub>2</sub> of various layer numbers; 10 rel. 1/cm detected.

## Spatial Resolution

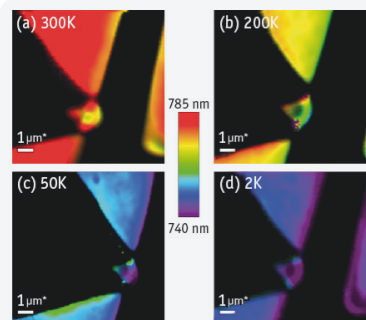


Confocal Raman scan of single-wall CNTs on Si at T=2K. Spatial resolution <400nm.

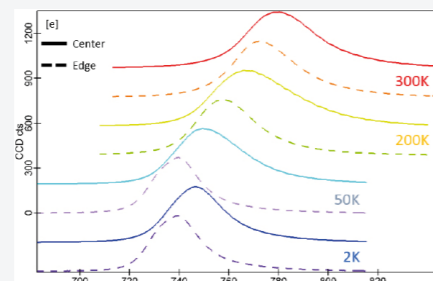
Jointly developed by attocube and WITec, cryoRaman blends attocube's cutting-edge cryostat and nanopositioning technology with the vaunted sensitivity and modularity of WITec's Raman imaging.

For the first time, Raman microscopy at cryogenic temperatures and in high magnetic fields is easily accessible and offers a unique user-friendly experience..

- hyperspectral imaging with unprecedented speed & resolution (spatial, spectral and depth)
  - automated Raman spectra at each pixel
- low-vibration closed-cycle cryostats
  - variable temperature at maximum field; solenoid and vector magnets
- various upgrades for wide variety of applications
  - low-wavenumber peaks detectable
  - polarization control
  - full automation of measurements



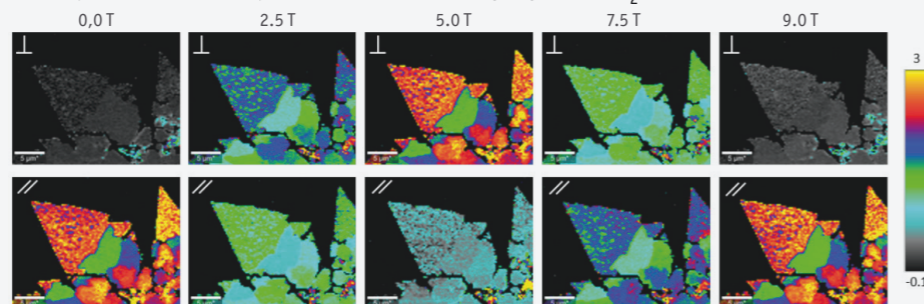
## Temperature-dependent PL on WSe<sub>2</sub>



Shift of the position of PL peak of monolayer WSe<sub>2</sub> with increasing temperature and the accompanying broadening of the PL peak.

## Magnetic field- and polarization-dependent Raman imaging on MoS<sub>2</sub>

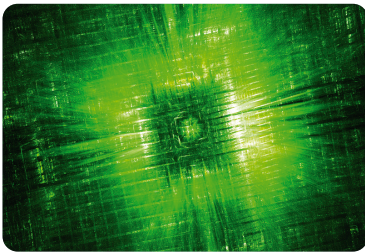
Intensity ratio of Raman signals A<sub>1</sub>' and E' in MoS<sub>2</sub> at 2K. The change in suppression of A<sub>1</sub>' from perpendicular to parallel polarization configuration as the magnetic field is increased from 0 to 5T, and back again from 5T to 9T.



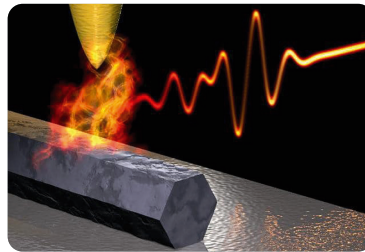


- highest spatial resolution: <math><400\text{nm}</math>
- highest spectral resolution: 0.8 rel. 1/cm
- sharpest depth resolution: <math><2\mu\text{m}</math>
- lowest cut-off: 10 rel. 1/cm
- lowest z-vibrations: 1nm pp
- most accurate power control: 0.1 mW
- quickest data acquisition: <math><1\text{ms/spectrum}</math>
- lowest temperature: <math><1.8\text{K} - 300\text{K}</math>
- broadest selection of magnets: up to 12T & vector fields

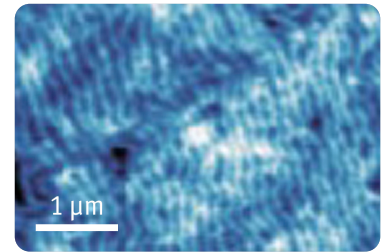
## Fields of Applications



**Optics & Spectroscopy**  
quantum optics



**Materials Science**  
investigation of material properties



**Surface Science**  
analysis of thin films & surfaces

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### White Paper

Proof-of-principle  
measurements with the  
cryoRaman microscope



SCAN ME