

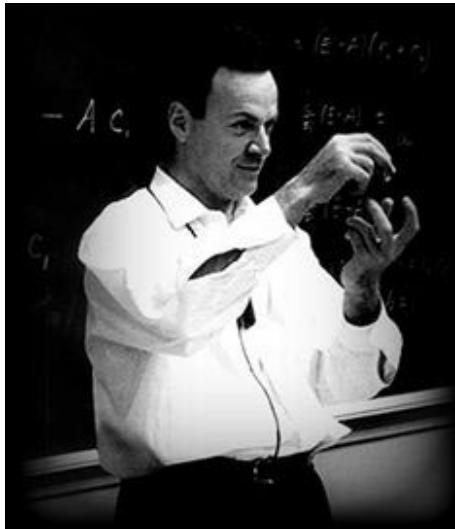


High Speed Scans at the Atomic Scale within the **EPICS** Framework



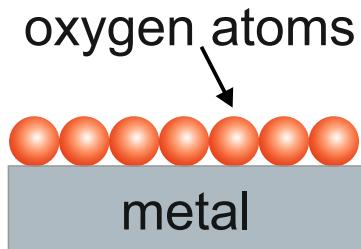
Leonard Gura, Zechao Yang, William Kirstädter, Florian Kalaß,
Patrik Marschalik, Matthias Brinker, Jens Hartmann,
Heinz Junkes, Markus Heyde, Hajo Freund

Science at the Atomic Level

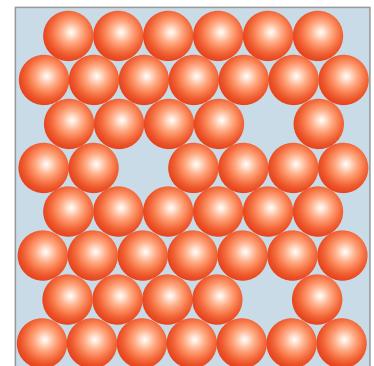
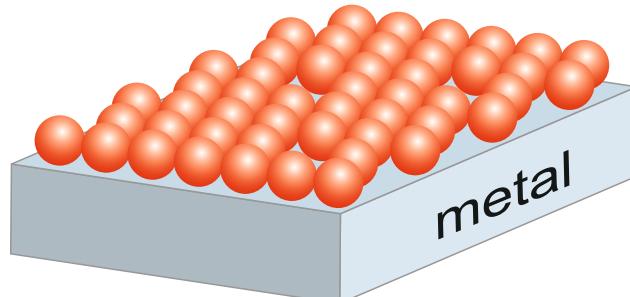


"Everything that living things do can be understood in terms of the jiggling and wiggling of atoms."

Richard Feynman

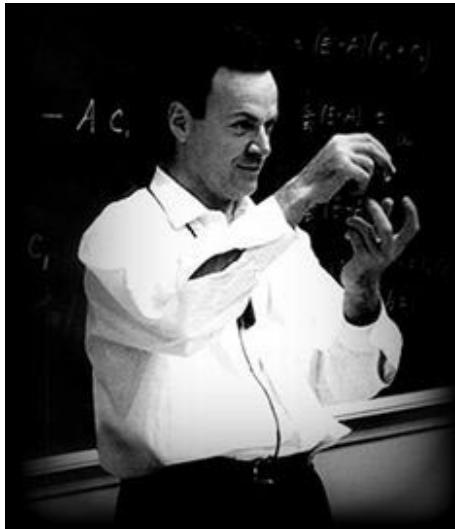


side view



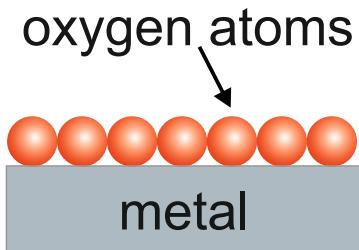
top view

Science at the Atomic Level

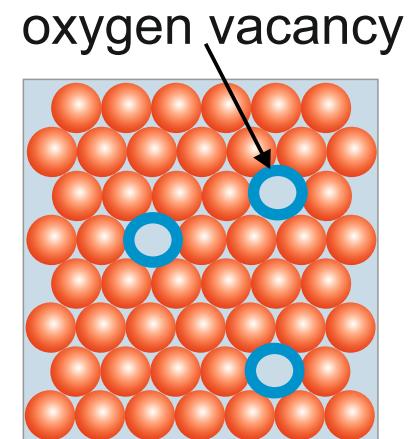
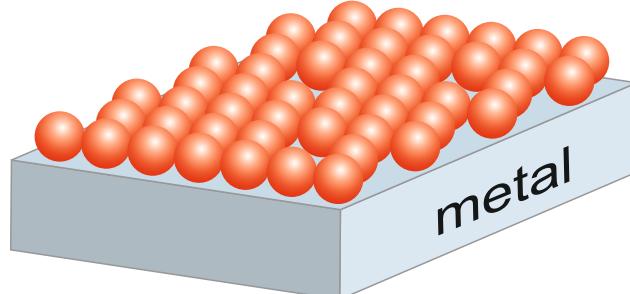


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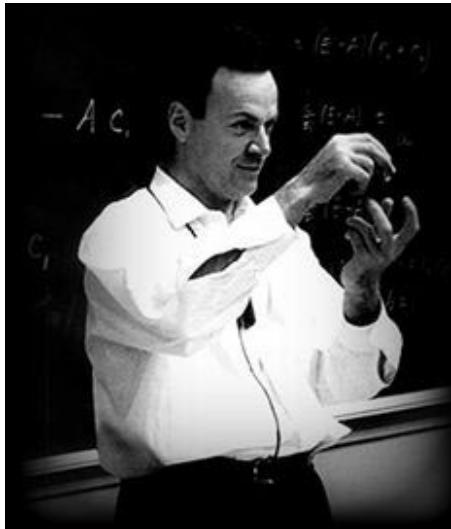
Richard Feynman



side view

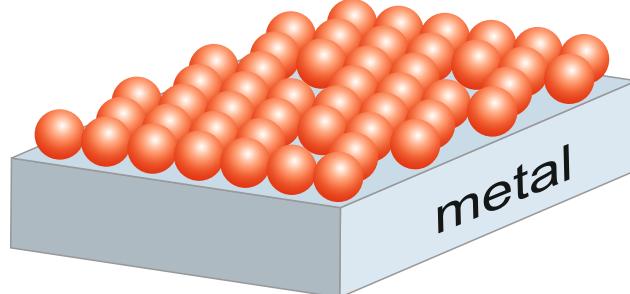
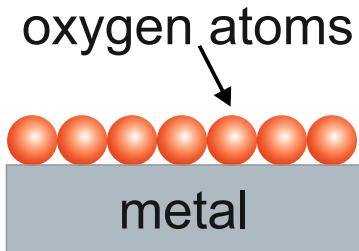


Science at the Atomic Level



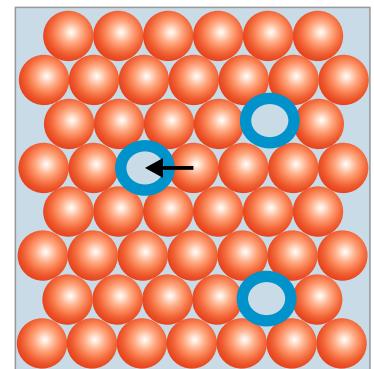
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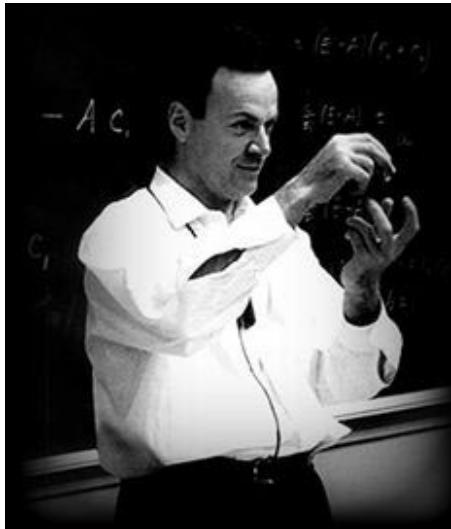


side view

atom diffusion

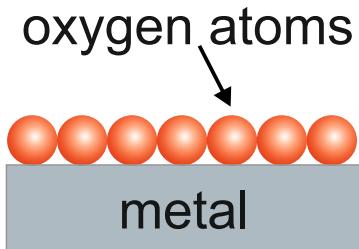


Science at the Atomic Level

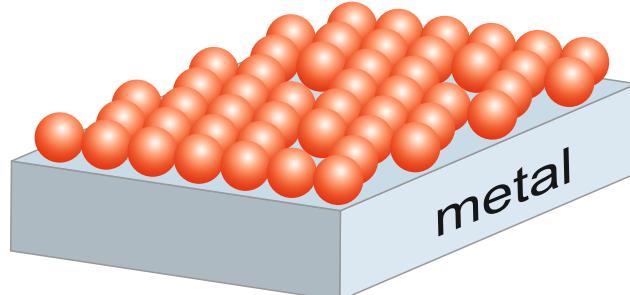


"Everything that living things do can be understood in terms of the jiggling and wiggling of atoms."

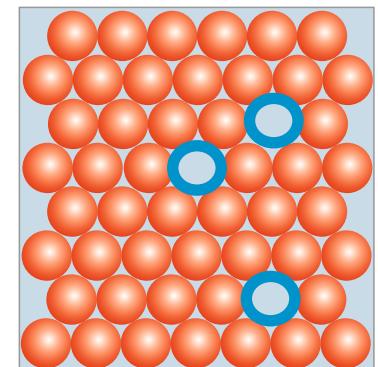
Richard Feynman



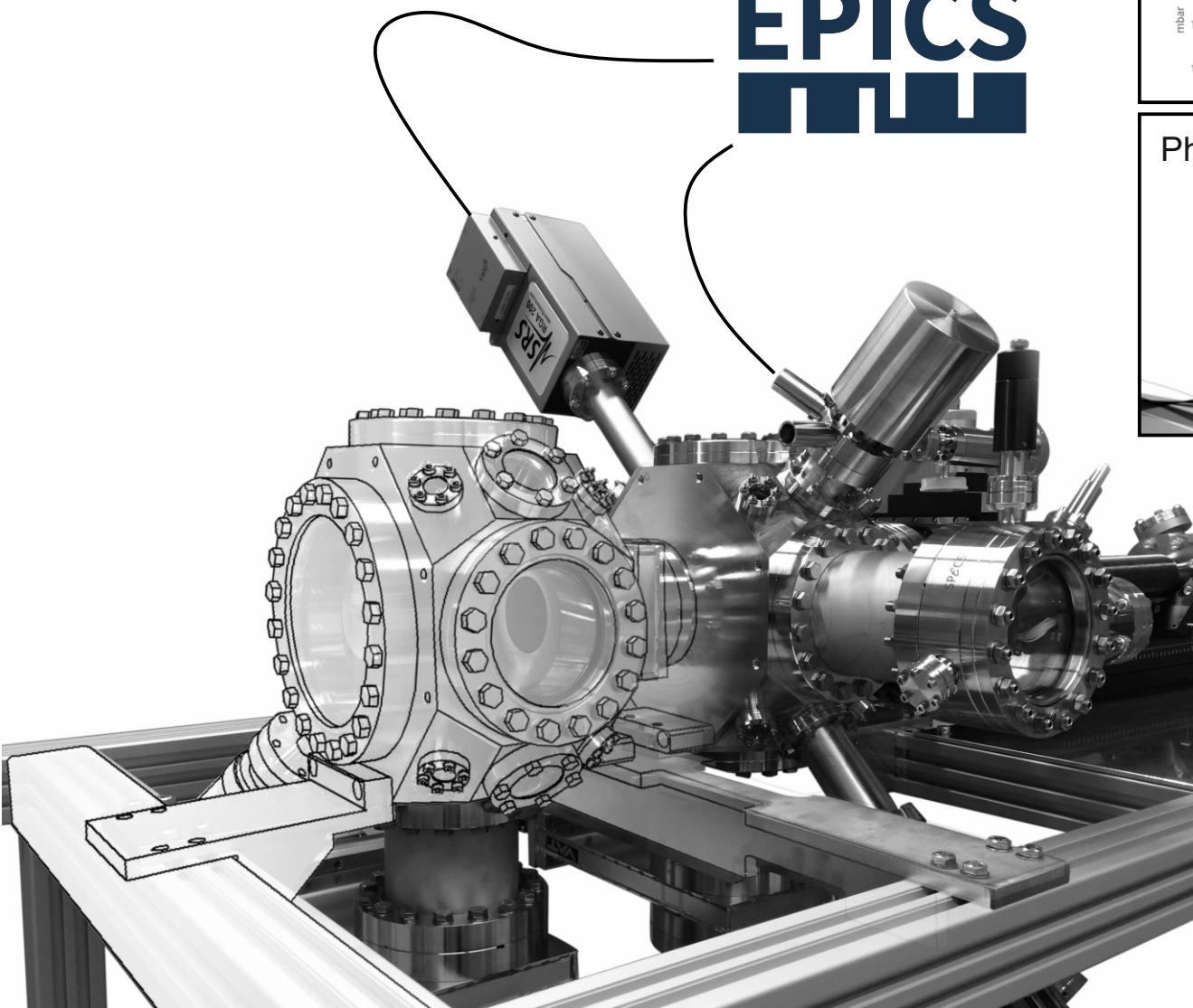
side view



atom diffusion



Our Experimental Setup



EPICS
m

Archiver Appliance



Phoebus

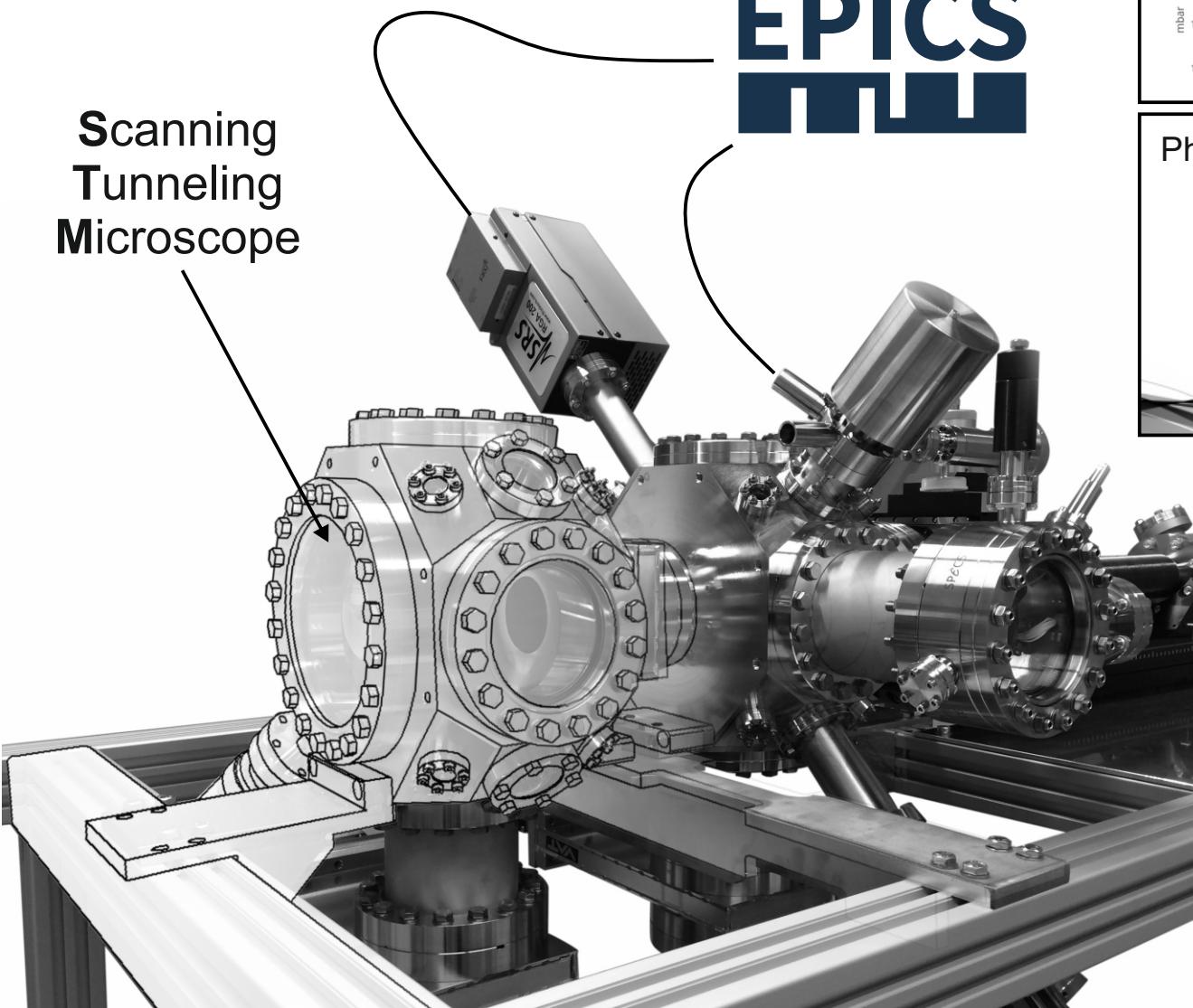


FRITZ-HABER-INSTITUT
MAX-PLANCK-GESELLSCHAFT

//////// CSS //////////

- Power Supplies
- T Controller
- Spectroscopy
- Pumps
- Vacuum Control
- ...

Our Experimental Setup



EPICS
m

Scanning
Tunneling
Microscope

Archiver Appliance



Phoebus

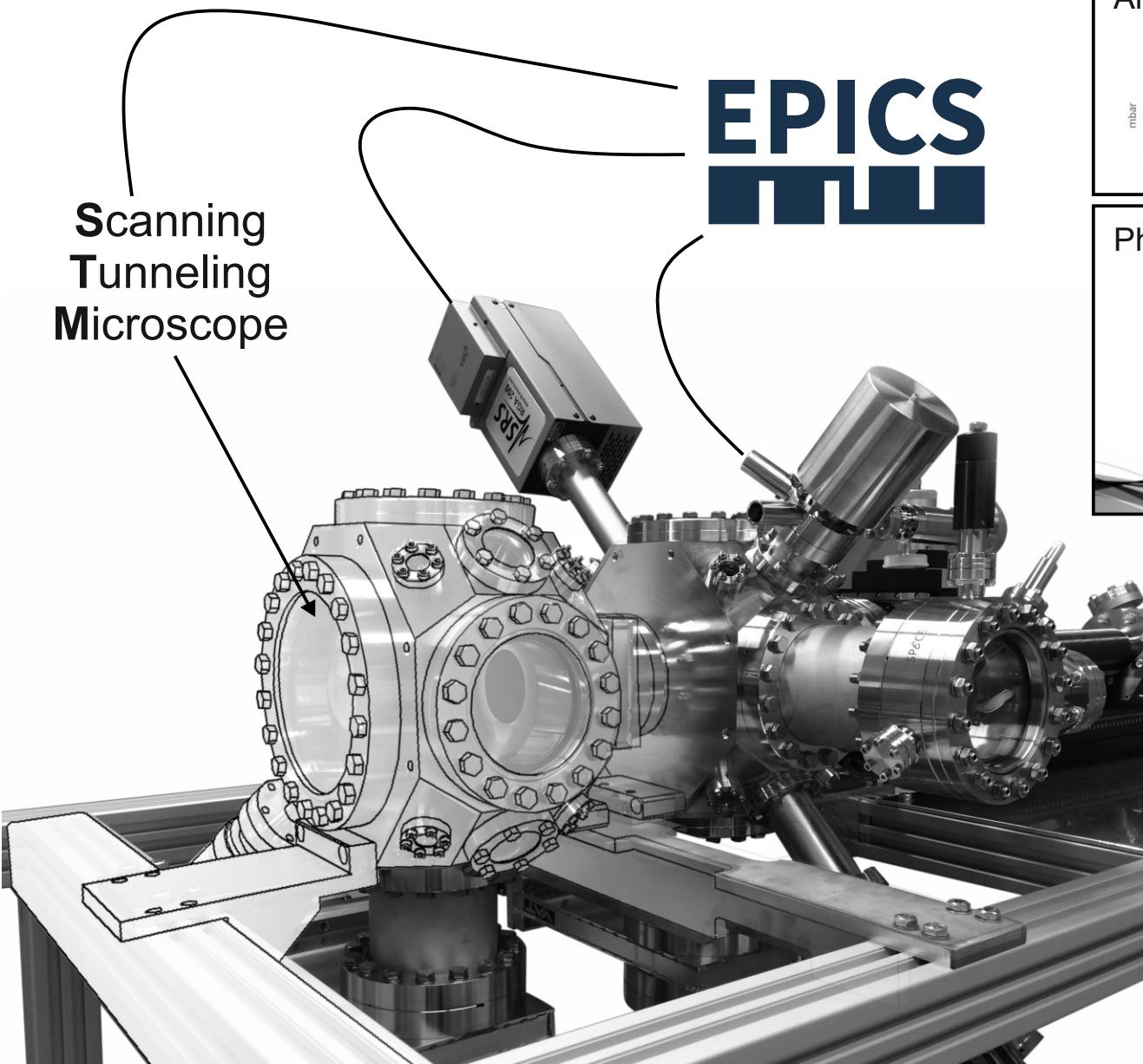


FRITZ-HABER-INSTITUT
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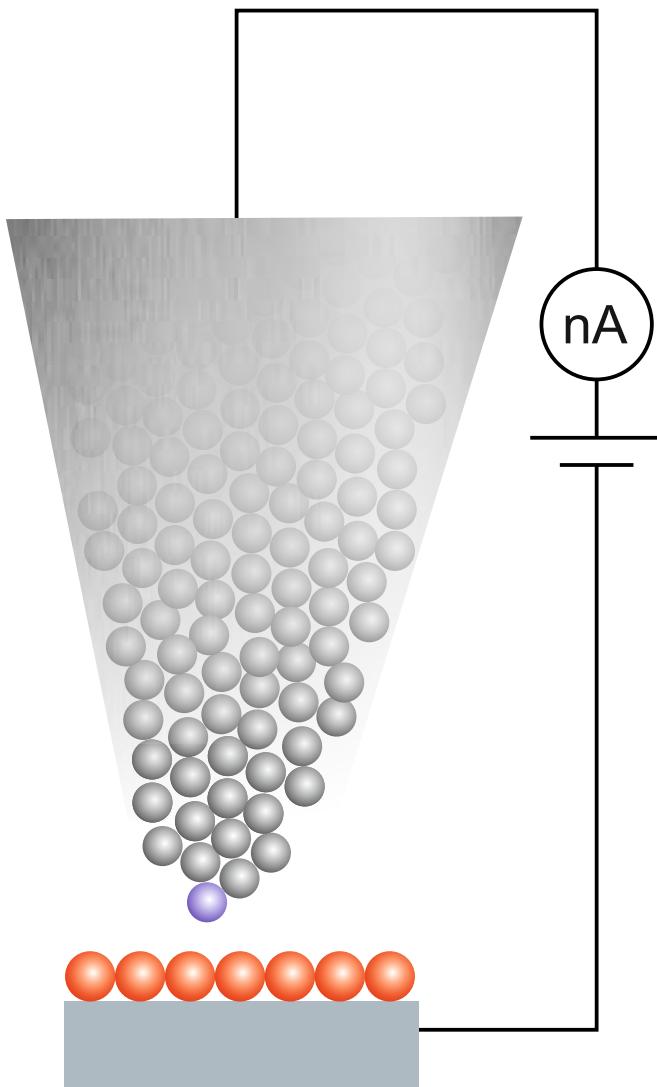


FRITZ-HABER-INSTITUT
MAX-PLANCK-GESELLSCHAFT

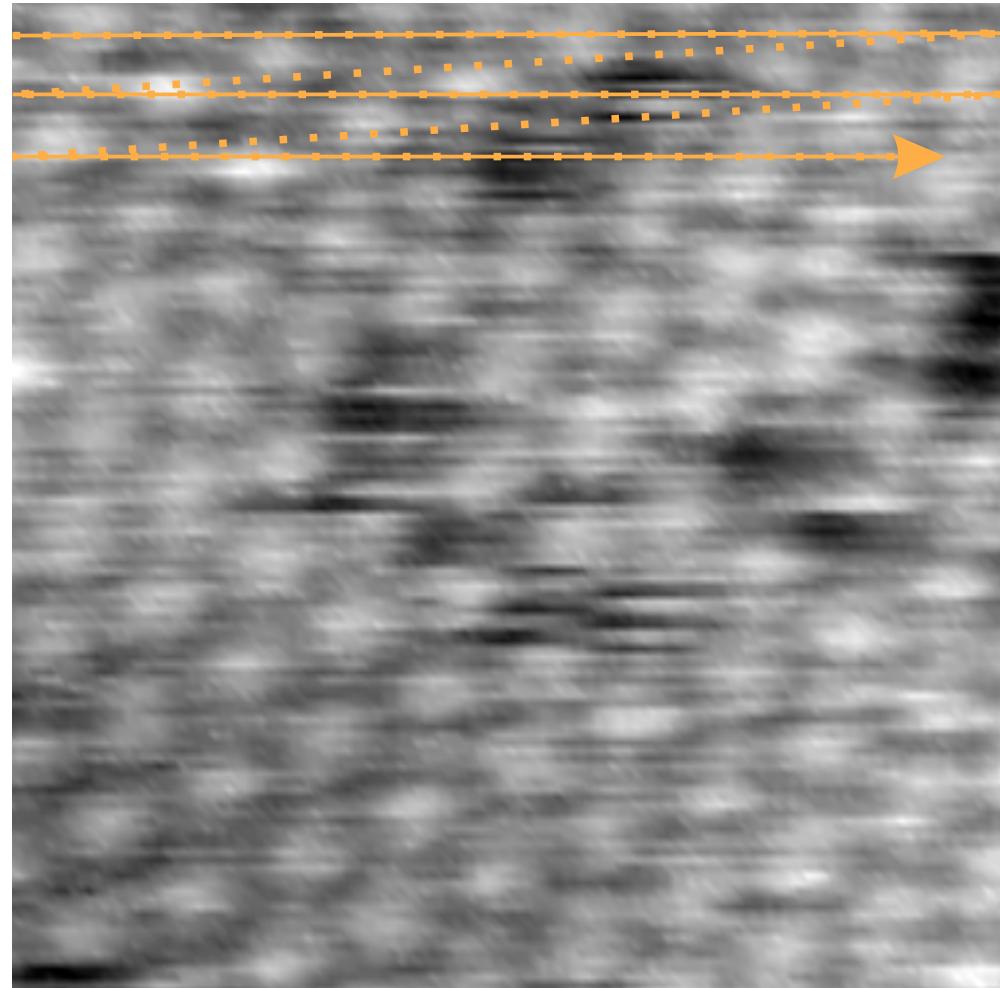
//////// CSS //////////

- Power Supplies
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Scanning Tunneling Microscope

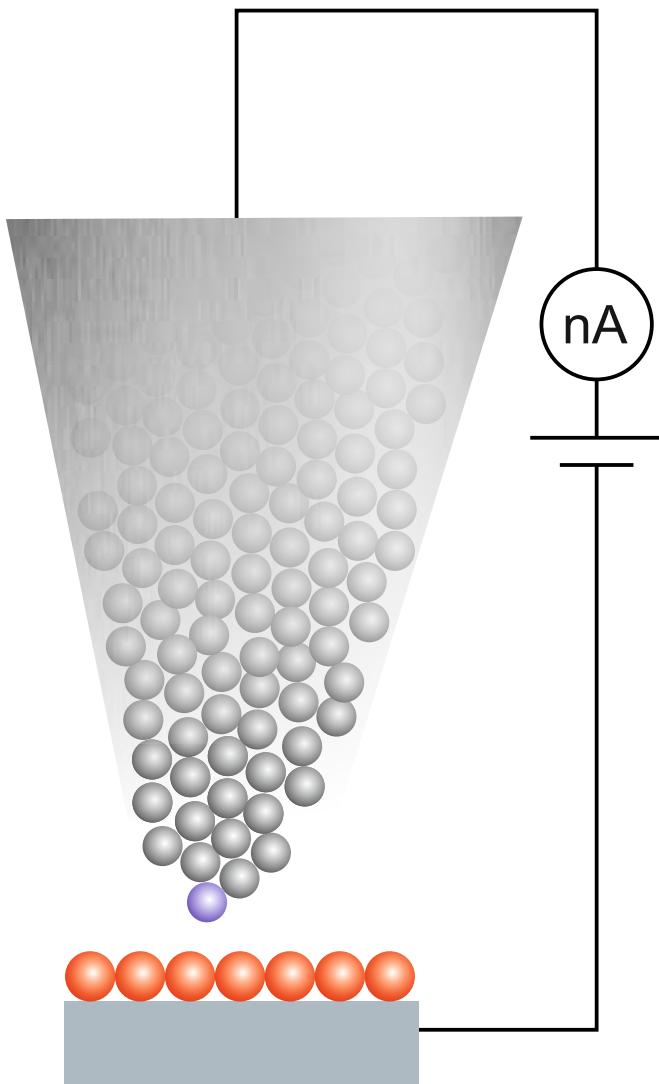


conventional scan takes ~ 1 min

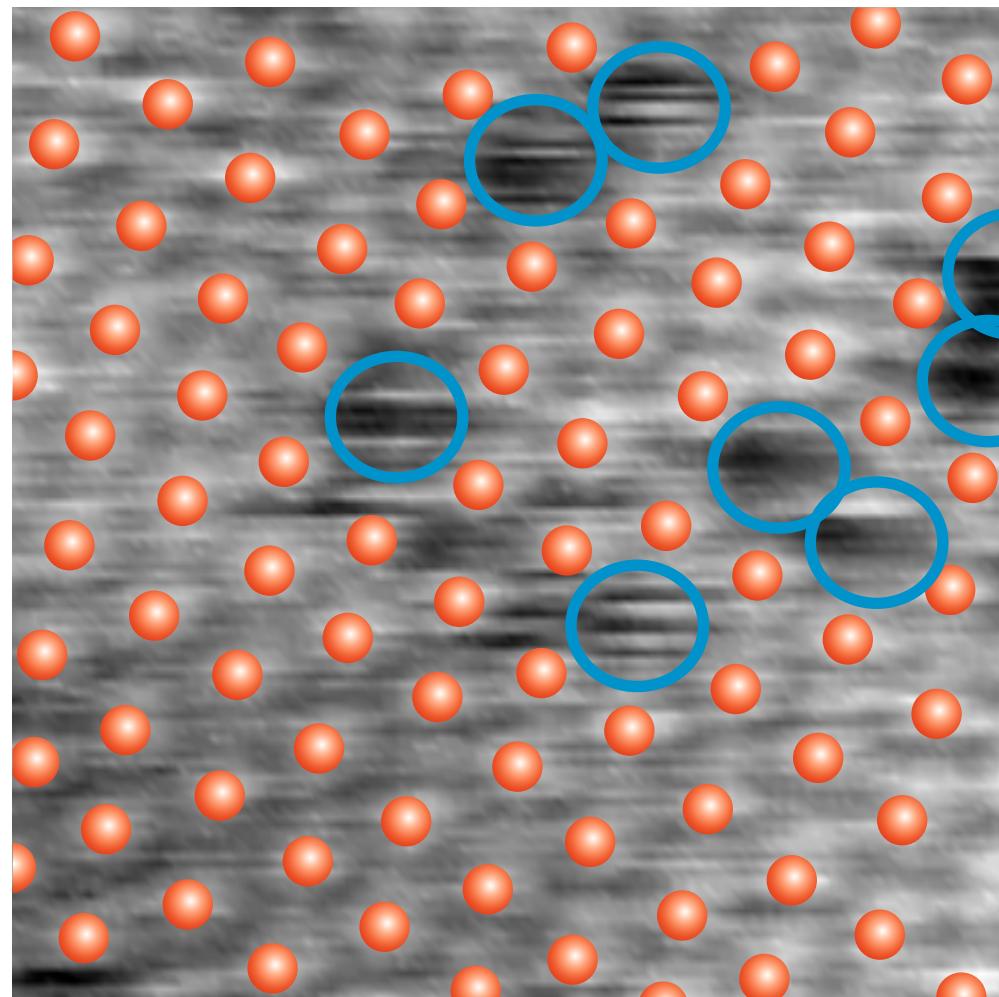


STM image, $5 \times 5 \text{ nm}^2$, $I_t = 1.4 \text{ nA}$, $V_s = 1 \text{ V}$

Scanning Tunneling Microscope

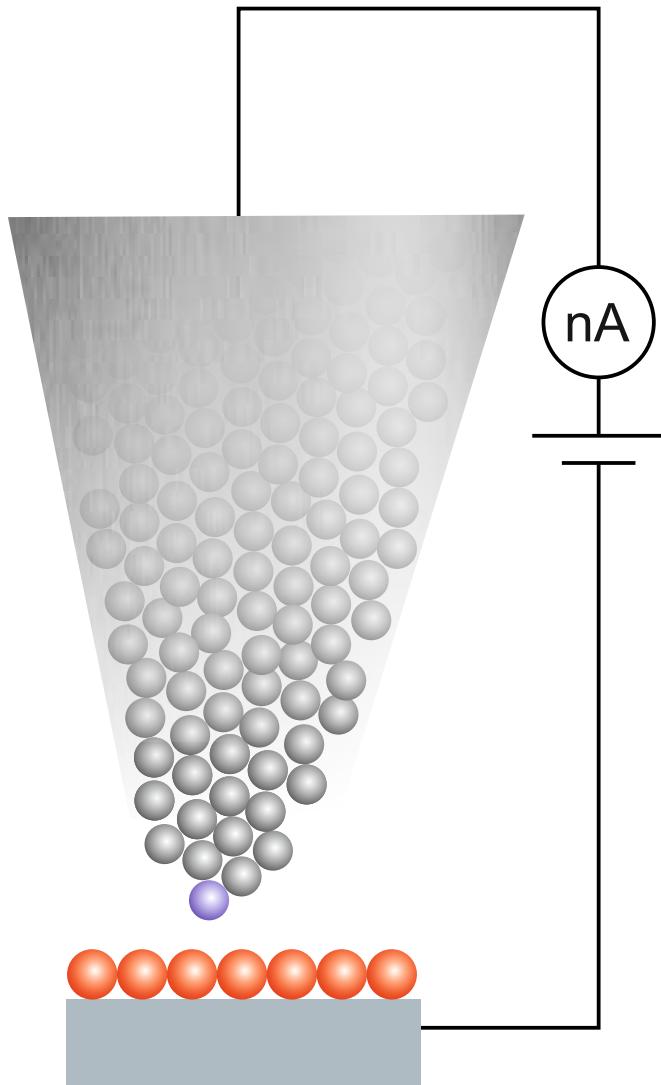


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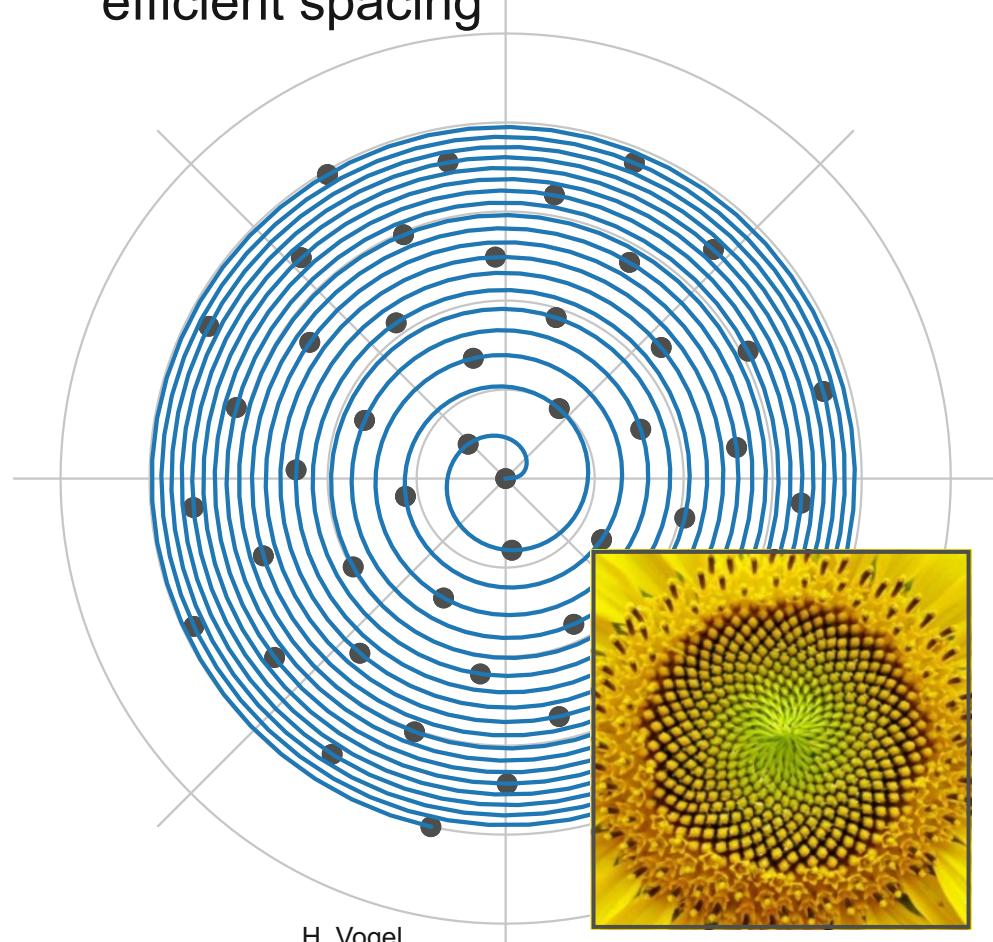


STM image, $5 \times 5 \text{ nm}^2$, $I_t = 1.4 \text{ nA}$, $V_s = 1 \text{ V}$

Scanning Tunneling Microscope



conservation of angular momentum
efficient spacing

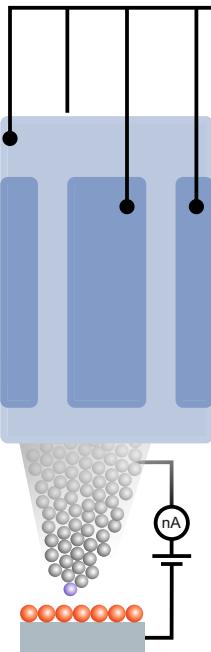


H. Vogel
A Better Way to Construct the Sunflower Head
Mathematical Biosciences 44 (1979) 179

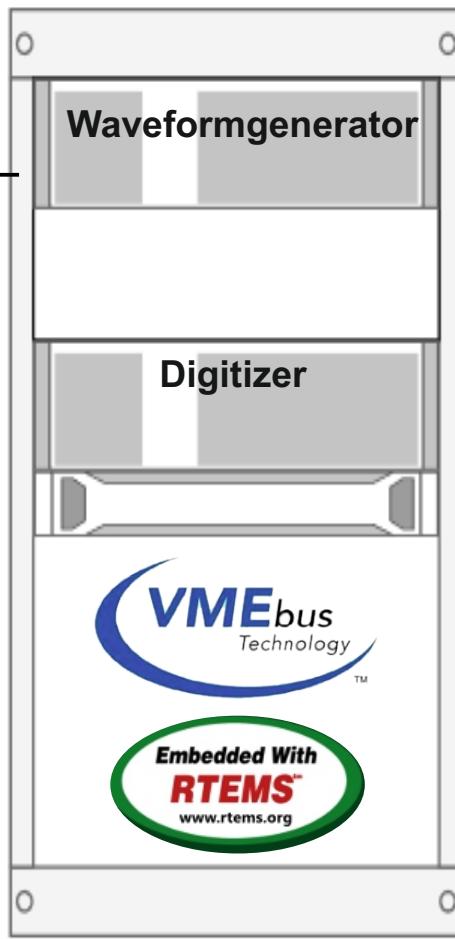
Spiral Scan Control

spiral scan

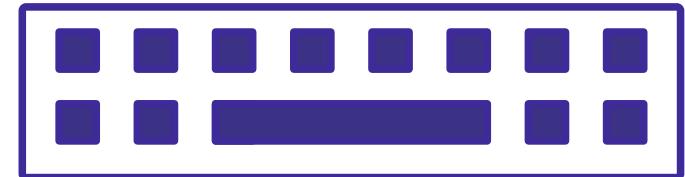
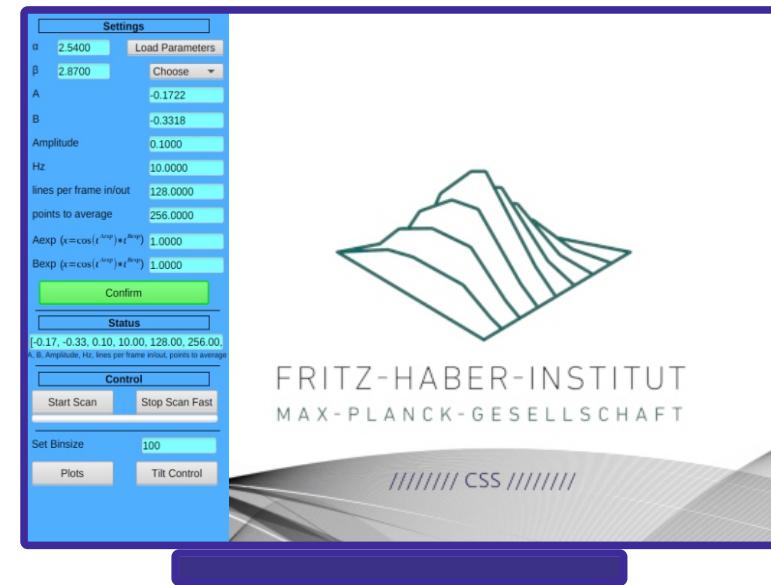
Scanner



high-speed electronics



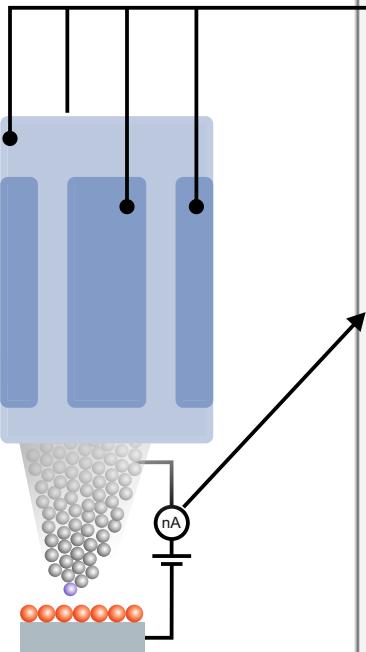
Phoebus interface



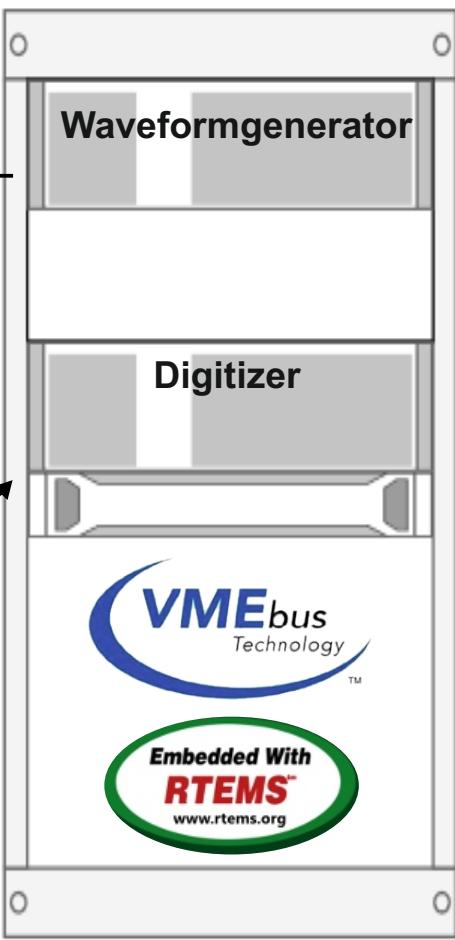
Spiral Scan Data Acquisition

spiral scan

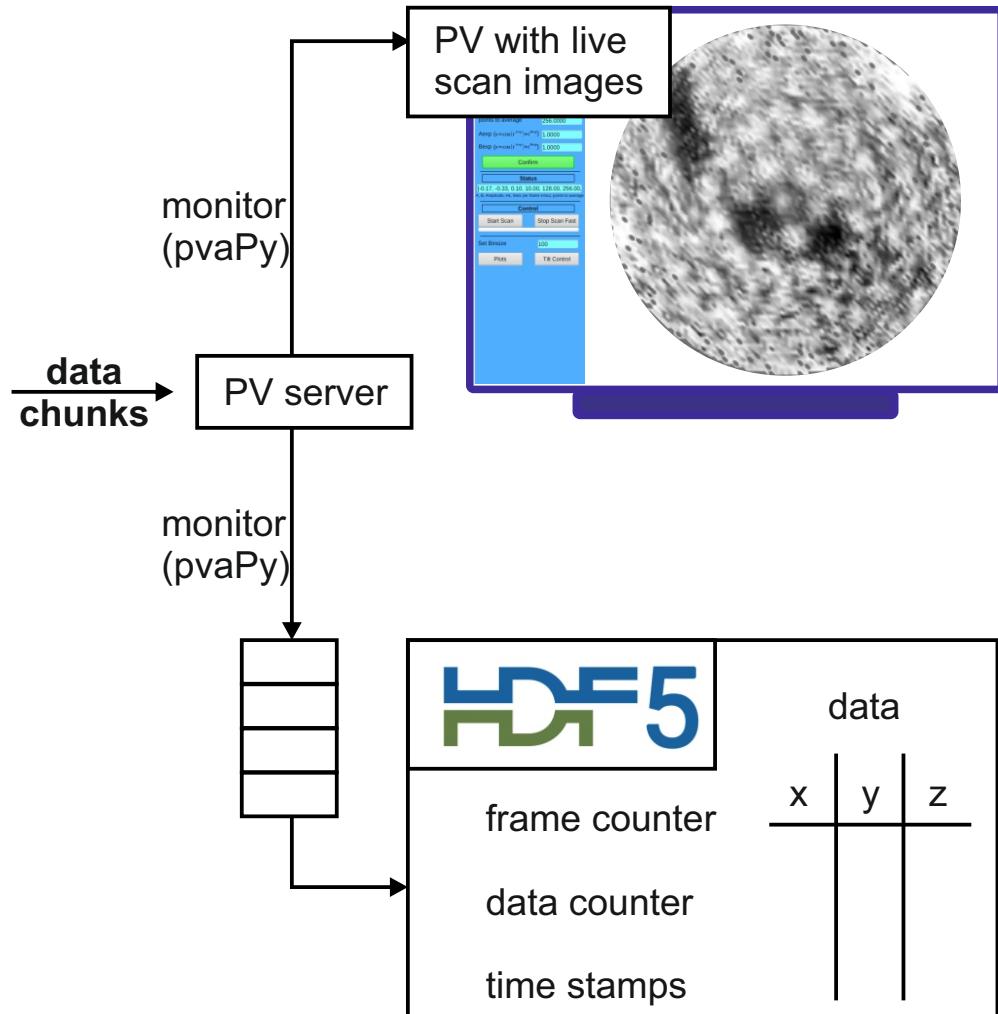
Scanner



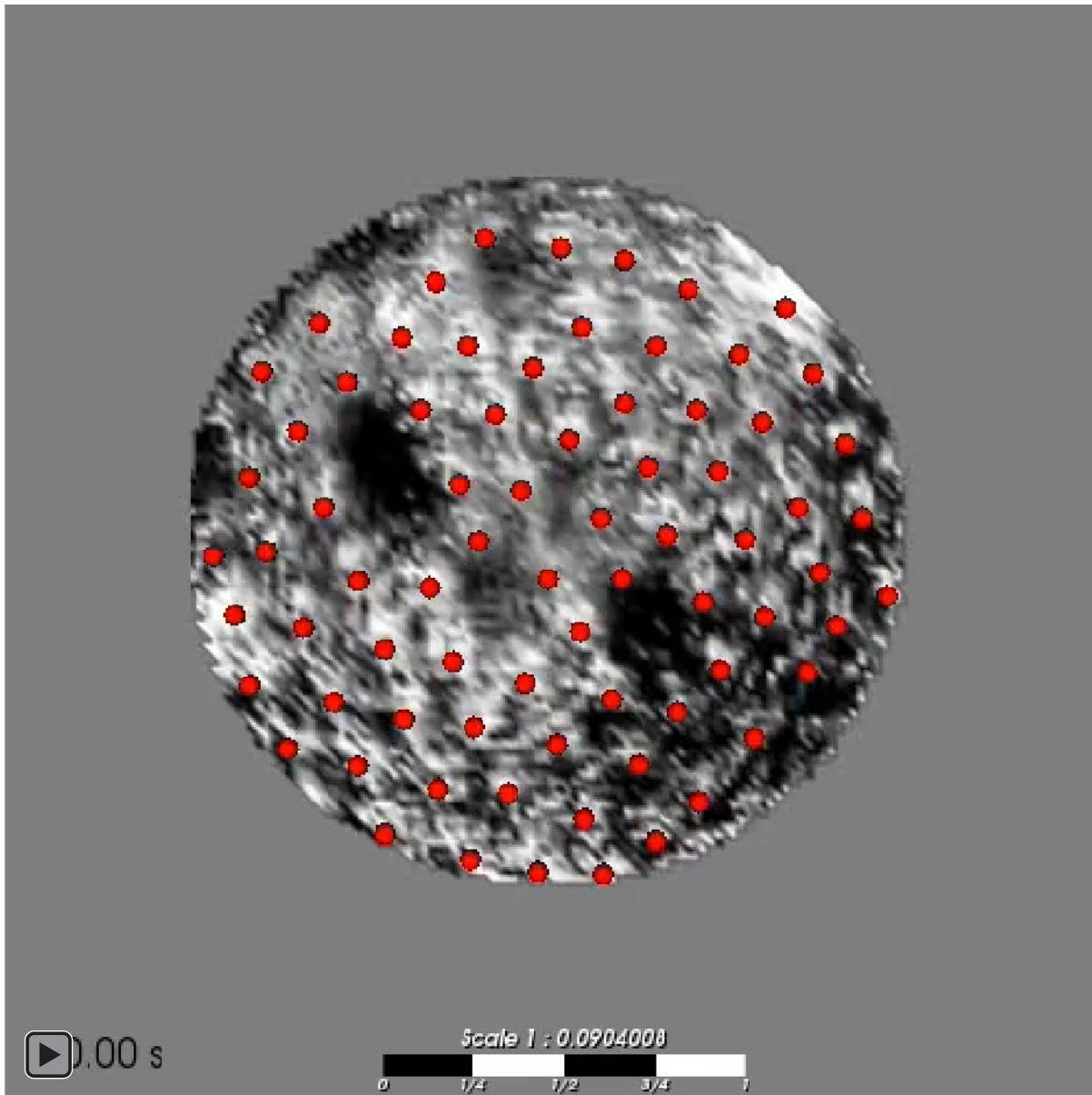
high-speed electronics



Phoebus interface



Dynamics at the Atomic Scale



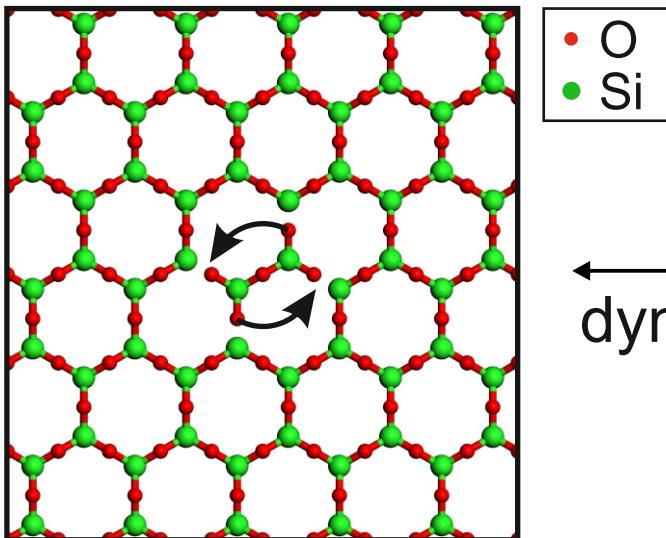
Outlook



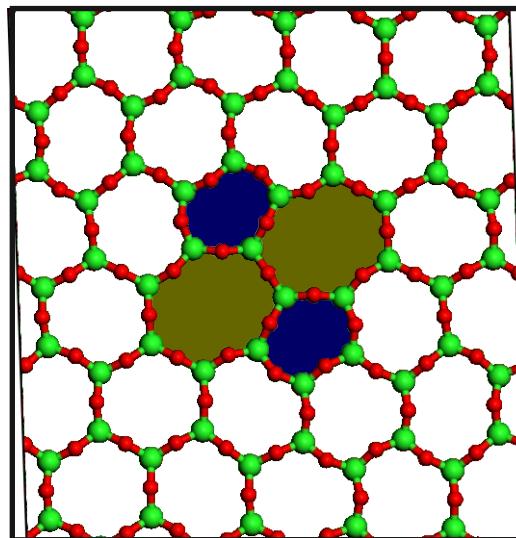
quartz



glass



↔
dynamics



THANKS!



William Kirstädter
Florian Kalaß
Patrick Oppermann
Heinz Junkes

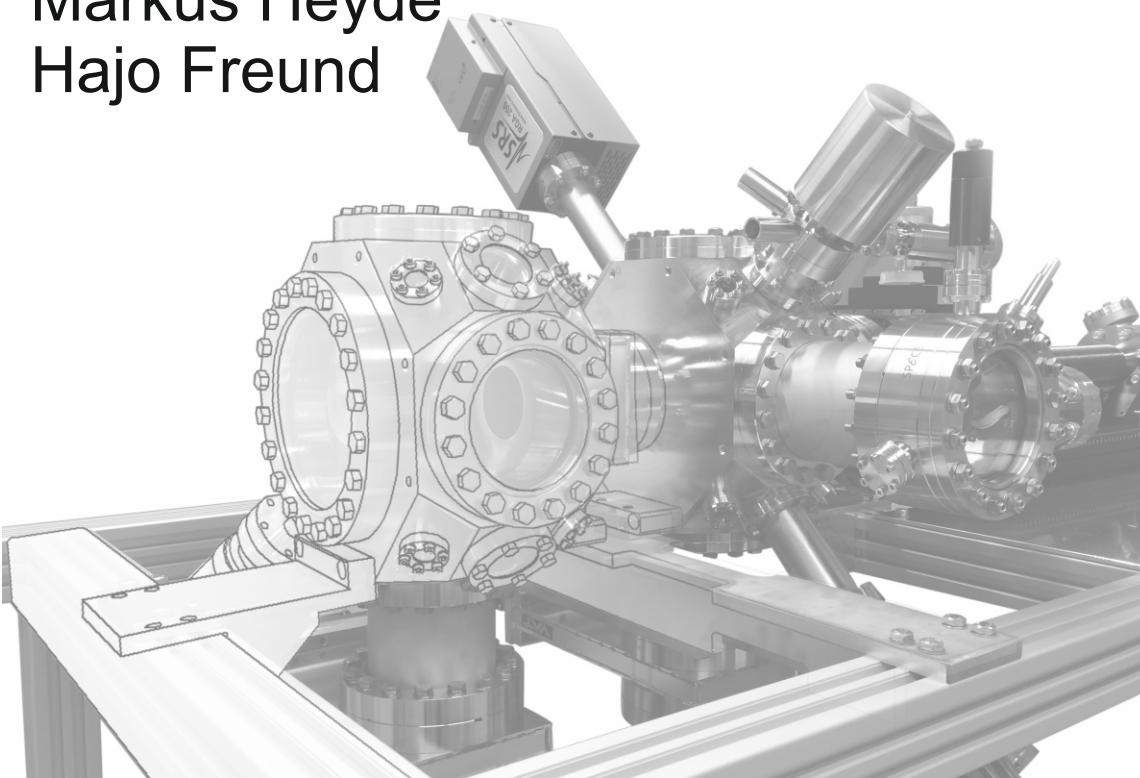


Patrik Marschalik
Siniša Veseli



Matthias Brinker

Zechao Yang
Jens Hartmann
Markus Heyde
Hajo Freund



Dominic Oram
Tom Cobb diamond

