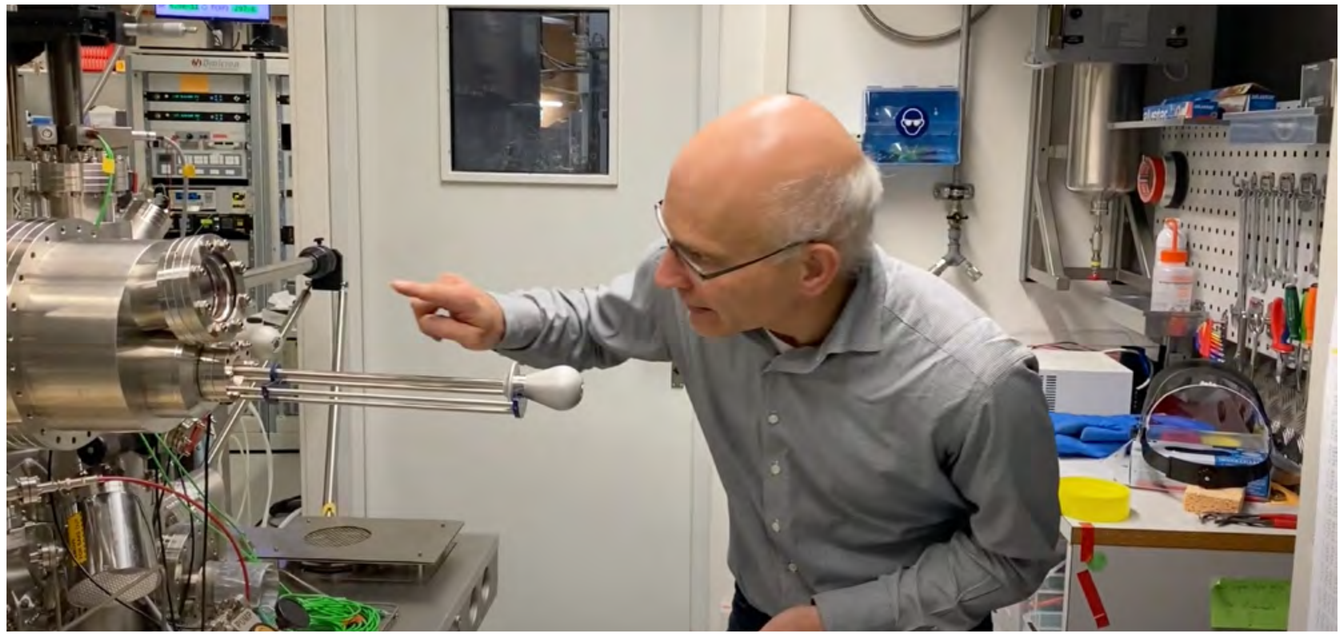
Support for titular professors at the PSI
Work by two research groups under Thomas Jung leads to synergies

Professor Thomas Jung is in charge of two closely cooperating research groups – the NanoLab at the University of Basel's Department of Physics and the Molecular Nanoscience group at the Paul Scherrer Institute (PSI). Together, the teams explore the mechanical, magnetic and electrical properties of molecules and nanostructures on surfaces. The different technical equipment installed in the two labs means the same samples can be analyzed using a variety of techniques. An example of this cooperation is the spectroscopic and microscopic examination of the same materials by both of Jung's teams.

Experimental station at the synchrotron
Some twenty years ago, researchers from the University of Basel, the PSI, Empa, the University of Zurich and the University of Fribourg formed a consortium to set up an experimental station at the PSI's Swiss Light Source (SLS) with the goal of conducting spectroscopic and microscopic examinations of different materials in combination.

The two physics professors Thomas Jung and Ernst Meyer from the SNI network are members of this consortium. The measurement station was established and is operated by Dr. Matthias Muntwiler, a member of the Molecular Nanoscience team. Muntwiler uses the synchrotron's special light for his own research at the PEARL Beamline, as the station is known, besides making it available to external research groups and customers from industry as a "user lab".

Wavelike boron nitride
In 2020, for example, in collaboration with the University of Zurich and the Federal University of ABC (Brazil) he was able to show that an atomic layer of hexagonal boron nitride on rhodium takes on a wavelike structure. Earlier examinations with the scanning tunneling microscope had already suggested this outcome, but it was only thanks to the synchrotron measurements that the material's exact shape could be determined.



Thomas Jung examines samples using a scanning tunneling microscope. (Image: M. Wegmann, SNI)

In another example, Jung's team works with magnetic molecules hovering above a substrate. The molecules change or lose their magnetization depending on their orientation, if they are located above a network with pores, for instance. This gives the researchers a better understanding of elementary magnetism, allowing them to develop new magnetic materials – for applications in quantum technology, for instance.

"Combining microscopy at the atomic scale with different forms of spectroscopy that measure electronic, optical or magnetic properties using synchrotron light is crucial to progress in nano and materials science today," Thomas Jung remarks. "The cooperation between the University of Basel and the PSI is an important contribution in this regard."

Preparing for a new light source
In 2025, the synchrotron at the PSI will be upgraded to an even better light source. Numerous PSI employees are already busy planning for this transition. Matthias Muntwiler and Thomas Jung, along with their colleagues at the PSI, have been hard at work making sure that "spectro-microscopy correlation experiments" can still be conducted with the "brighter" light generated by the new light source.

"In 2020 the strategy for the adjustment of the experimental station to the even more powerful light source was approved, which was an important milestone for us," Jung explains. There is a great deal of work still to be done over the next few years to ensure that the measurement station remains available to researchers both from Switzerland and all of Europe.

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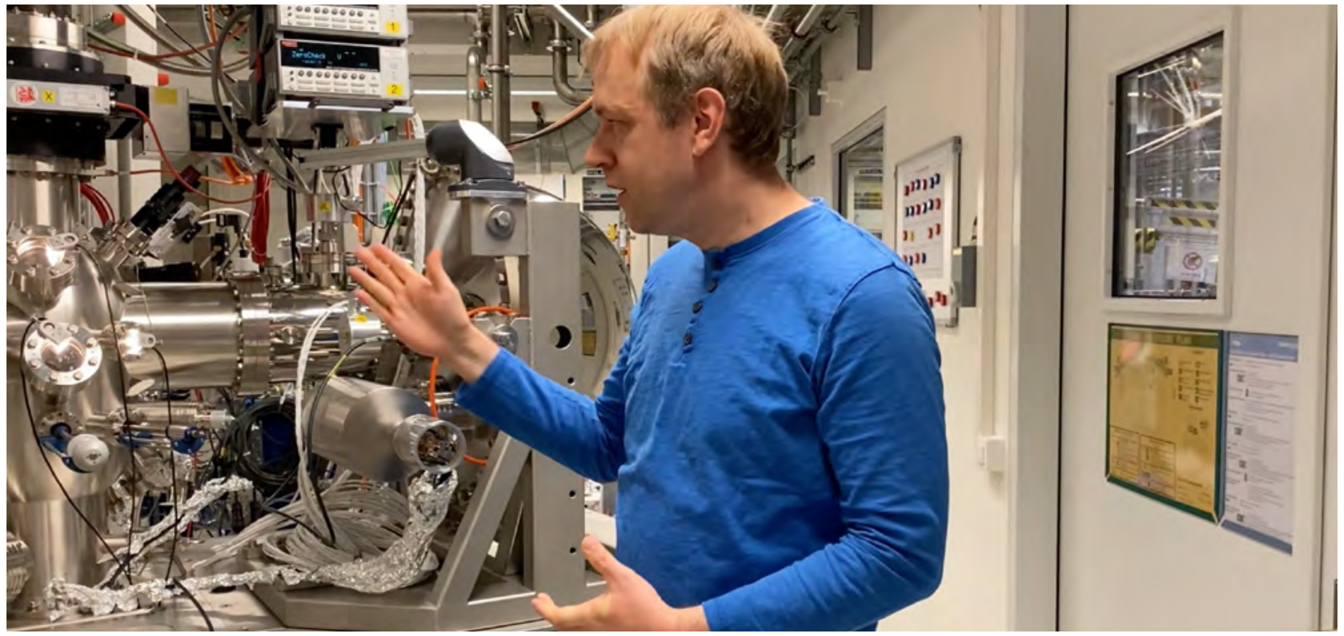

Matthias Muntwiler uses the synchrotron's special light to provide spectroscopic data. (Image: M. Wegmann, SNI)