

POLAR 1 K

1 K pot NOW available for POLAR SPM

The low temperature POLAR bath cryostat SPM was designed for STM and QPlus® measurements with the highest resolution. The cryostat, which was developed in-house, enables a minimum temperature of $T < 5$ K with an ultra-low helium consumption, providing an exceptionally long helium hold-time.

POLAR SPM was designed, right from the beginning, to enable the introduction of a number of variants over time. Since the product launch, we have successfully integrated a superconducting magnet for vertical fields of 5 Tesla, a temperature variation facility for fast temperature variations of the sample (e.g. 50 K steps within only 5 minutes!), and the integration of a motorised lens for TERS measurements.

Now we have achieved the next milestone: The integration of a 1 K pot into the very compact bath cryostat of the POLAR. With this option, temperatures of below 1.7 K (typically < 1.5 K) can be realised. Conventional 1 K pots are operated in the so-called “continuous mode”, in which a needle-valve is used to adjust a permanent helium flow through a small 1 K pot volume. With this conventional approach, the flow changes over time, requiring frequent adjustments of the needle valve to keep the flow and temperature constant. In contrast to the conventional design, in the POLAR, the 1 K pot is operated in the so-called “single-shot mode”. This means that the 1 K pot is filled only once and then pumped until it is empty. This mode has several advantages: i) no adjustment of helium flow is necessary; ii) better temperature stability and thus, iii) better drift performance at low temperatures. The volume of the 1 K pot was designed to achieve an excellent long holding time of typ. 100 hours at $T < 1.7$ K. The 1 K pot can be combined with other options such as the 5 Tesla magnet, QPlus®, or the temperature variation package.

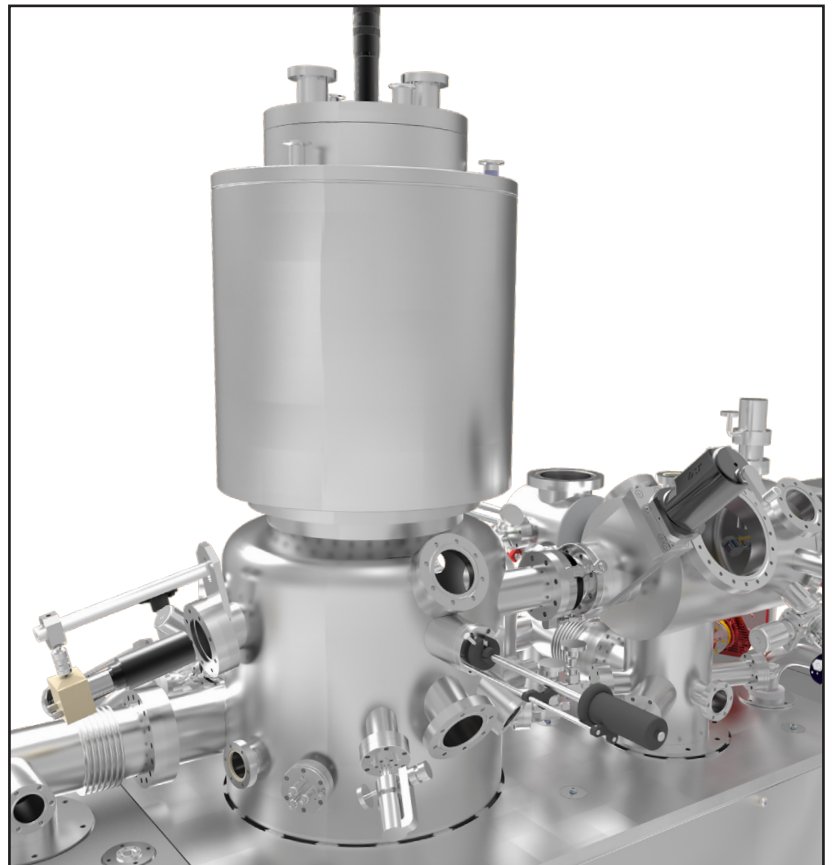
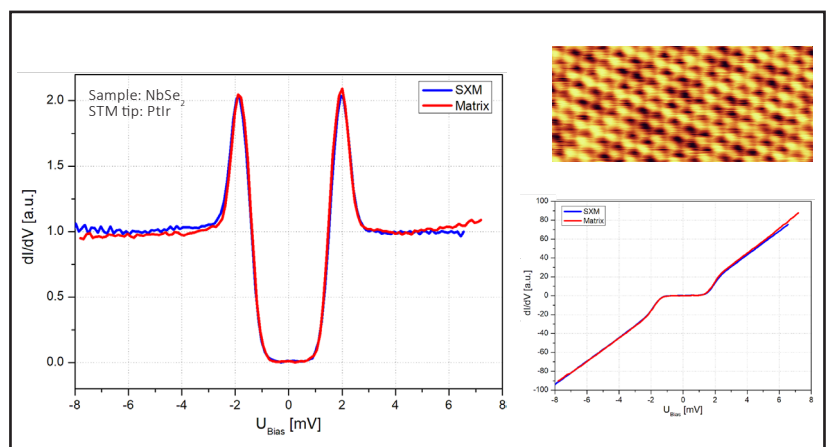


Figure: POLAR SPM lab with corresponding SPM chamber and sample preparation facility.



STM/STS at $T = 1.49$ K with POLAR 1 K pot: NbSe₂, $A_{mod} = 100 \mu V_{rms}$
 Right image: STM topography on NbSe₂
 Right spectrum: corresponding I-V spectra
 The existence and the shape of the superconducting energy gap of NbSe₂ is clear proof of the achieved temperature of $T < 1.7$ K.

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