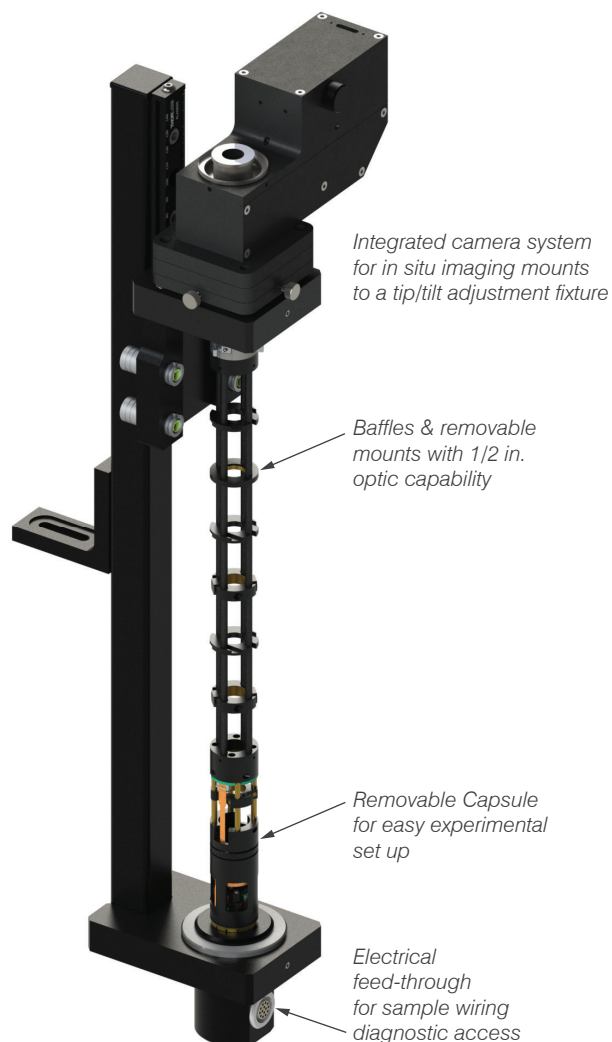# Optical Multi-Function Probe (OMFP)

DynaCool (D725A/B) / PPMS (P725A/B) / VersaLab (V725A/B)

The Optical Multi-Function Probe (OMFP) offers unprecedented versatility in affording the user optical access to experiments within the variable temperature and magnetic field environment of the PPMS® family of instruments. At the top of the OMFP, a wired access port (WAP) features an axial optical port window for free-beam experiments in the cryostat. The WAP also features modular feedthrough connectors that can be configured to allow electrical signals or fiber access to the sample space. Adjustable optical mounts can be placed along the length of the probe to position filters, relay lenses, objectives, or other elements. The capsule at the bottom contains a three-axis piezo stack allowing the in-plane position to be adjusted, and for the sample to be moved into the proper focal plane. Integrated thermometry supplies temperature readings as close to the sample as possible for accurate mapping of temperature-dependent phenomena.

Key Features:

- Customizable 1" (SM1) free-beam access port and internal ½" (SM05) mounts along the optical path
- Modular feedthroughs available for electrical signals into the sample space
- Eight contacts (2 sets of 4) available on a removable PCB sample platform for electrical measurements using existing QD transport options or external electronics
- Optional variation (725B) includes eight additional electrical feedthroughs at the sample location, accessible externally via the WAP
- Optical camera allows for fine alignment and focus *in situ*
- XYZ piezo-positioning system enables multiple samples or regions of interest to be investigated
- Complete integration of imaging and positioning with MultiVu software sequence commands
- Includes a test station for *ex situ* alignment of optical elements and testing for proper electrical connections to the sample

Integrated camera system for in situ imaging mounts to a tip/tilt adjustment fixture

Baffles & removable mounts with 1/2 in. optic capability

Removable Capsule for easy experimental set up

Electrical feed-through for sample wiring diagnostic access

The external OMFP test station can be used to easily align optics ex situ and check for proper electrical connection to the sample.

XYZ Positioning Stage removed from the capsule housing. OMFP Positioner Capsule with sample boards and extraction tool.
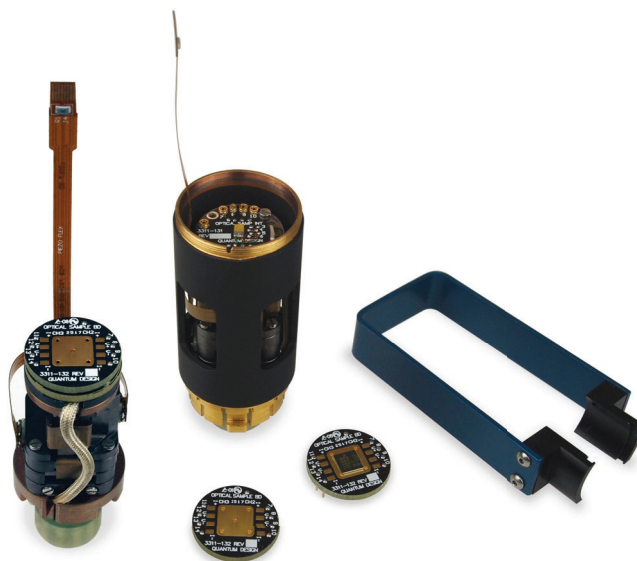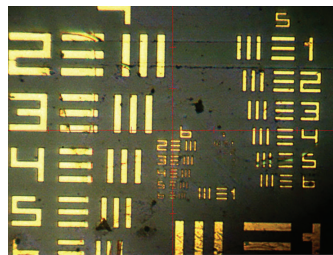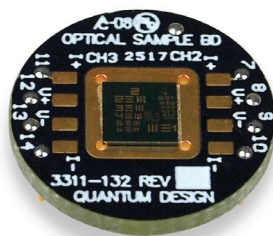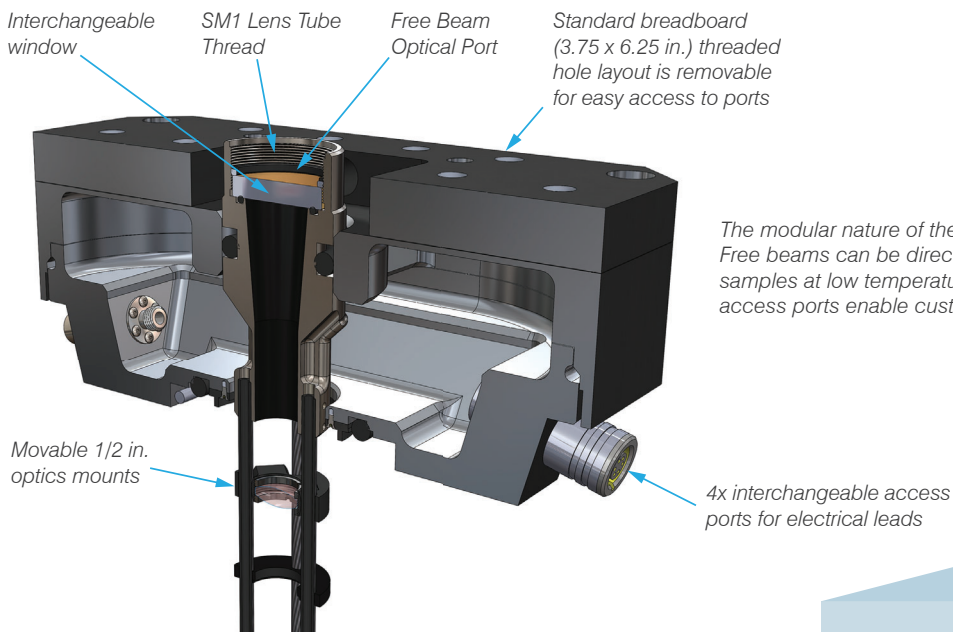
Included 1951 USAF resolution test chart sample is shown mounted on a sample board (left). Image of the target taken using the integrated image capture software demonstrating the approximate system resolution (right).

Optical Multi-Function Probe (OMFP)

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Interchangeable window

SM1 Lens Tube Thread

Free Beam Optical Port

Standard breadboard (3.75 x 6.25 in.) threaded hole layout is removable for easy access to ports

The modular nature of the OMFP allows for creative experimental design. Free beams can be directed through a variety of optical components to samples at low temperatures and high fields, while the interchangeable access ports enable customized applications.

Movable 1/2 in. optics mounts

4x interchangeable access ports for electrical leads
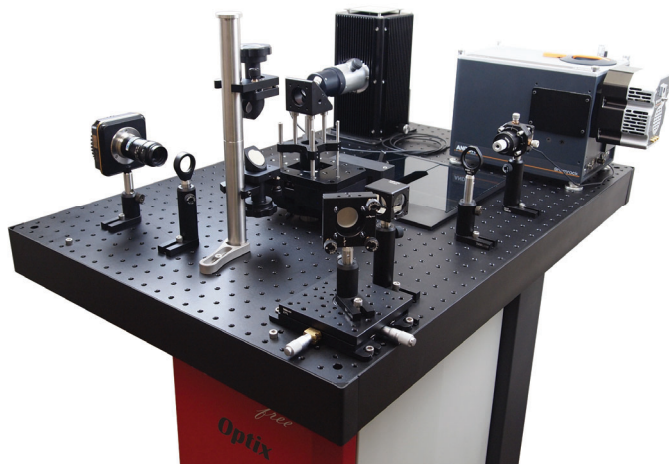
The PPMS® Optix, an optical breadboard attachment, enables further integration of the OMFP with custom optical experiments. Shown here installed on a PPMS VersaLab, the Optix option is available for all members of the PPMS family of instruments.

Optical Multi-Function Probe Specifications

Temperature [T]
Range*:   350 to 5 K (DynaCool, PPMS)
                              350 to 50 K (VersaLab)

Axial Optical Window
Coupling Type: SM1 (1" diameter)
Included Coatings: 350 to 700 nm, and 650 to 1050 nm

Camera Resolution: $< 5\,\mu$m**

Piezo-Positioner Stack
Maximum Travel: 3 mm (all axes)
Minimum Step Size***:   1 μm to 1 mm (approx.; user-controlled)
Control Mode***:   Open Loop

Operational Range: 0 to 16 T

*Base temperature of 5 K represents the minimum achievable stable temperature under 10 mW of radiant flux.
**Based on resolving individual lines within group 6, element 6 of the 1951 USAF resolution test chart.
***Due to hysteretic effects intrinsic to the piezo-resistive drive elements and open loop operation, precise step sizes may not be repeatable between different temperatures, upon changing drive direction, or at the extreme points of the available range.

Specifications are subject to change without notice.