

The Basov Group at Columbia University experienced a 10x reduction in vibration thanks to TMC's customized solution.



INDUSTRY

Physics Research



TECHNOLOGY

Quantum Materials



AFFILIATION

Columbia University

SITUATION

Dmitri Basov, the founder of the Basov Group, is a professor in the Department of Physics at Columbia University. His research focuses on electronic phenomena in quantum materials that he investigates using various nano-optical techniques developed in his laboratory.

As an experimental physicist, Dmitri studies the optical properties of new materials to learn how to control those properties with light. Through this effort, he strives to create new quantum phases that don't exist in nature at equilibrium.

Dmitri moved his lab from a very quiet and stable basement in San Diego to the twenty-second floor of a building in Manhattan. Unfortunately, the vibration level at the new location is much higher than at the previous location.

"We are trying to resolve features as small as a few nanometers, but the vibration in Manhattan and the minute swaying of the building created a challenging condition for vibration isolation," said Dmitri. "This condition prevented our lab from being able to perform nano-spectroscopy and nano-imaging using the unique instrumentation that we use. Unfortunately, no viable solution existed."

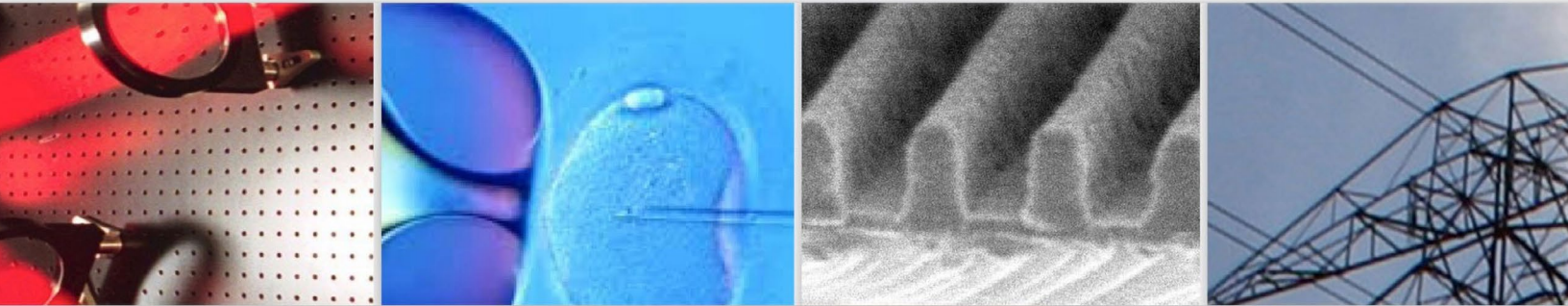
Continuing his research meant finding a way to stabilize his equipment. To develop a solution, Dmitri turned to TMC.



"We are extremely happy that the solution that TMC has provided has worked out marvelously. It's quite a miracle."

DMITRI BASOV

Professor, Department of Physics
COLUMBIA UNIVERSITY



SOLUTION

First, TMC partnered with Dmitri to understand the conditions of the site and the needs of the application. Then, after developing a customized solution, TMC installed its LaserTable-BaseTM, which includes STACIS[®] technology.

LaserTable-Base offers an extraordinary level of improvement over existing technology relating to the amount of vibration isolation attainable with an optical table. Typically, optical tables are supported by pneumatic vibration isolation systems. Though very effective at isolating high frequencies, these passive systems actually amplify vibration in the critical 1 to 3 Hz range.

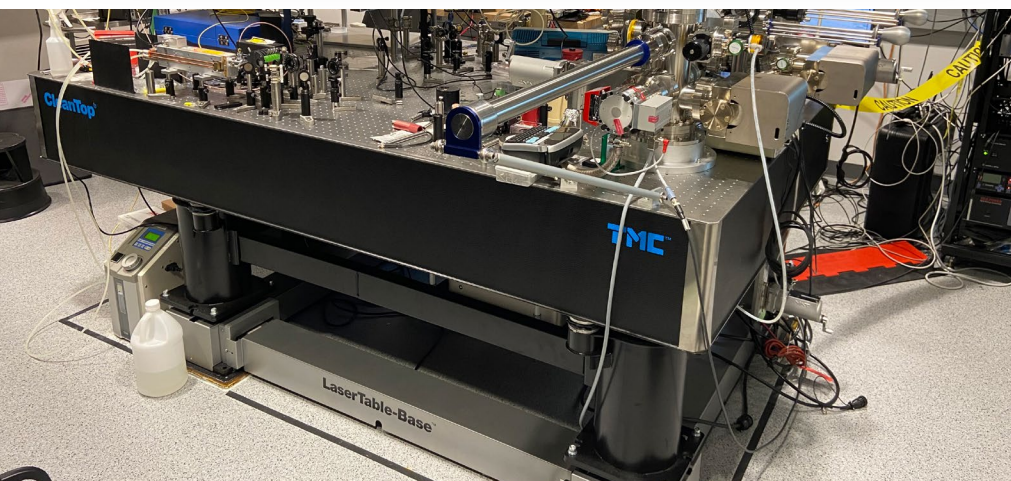
TMC's STACIS technology overcomes these limitations through proprietary technology, which incorporates piezoelectric actuators and inertial vibration sensors to cancel—not amplify—very low frequency vibration.

LaserTable-Base combines pneumatic isolation technology and STACIS active piezoelectric cancellation technology into one integrated cancellation system. The result is vibration cancellation at very low frequencies and unprecedented levels of high frequency isolation due to the combined effect of two isolation systems in series.

BENEFITS

TMC created a stable environment for Dmitri's work so that his instrument could perform properly.

According to Dmitri, "We are working in fundamental discovery science. We are doing things that nobody has done before, and for this nanoscale type of measurements, having a stable environment for the experiment is a starting point."



Shown is one of the Basov Group's cryogenic scanning near-field optical microscopes that uses TMC's LaserTable-Base.