CMQT
CENTER FOR **MOLECULAR QUANTUM TRANSDUCTION**

Fifth Annual CMQT Symposium

April 23 & 24, 2026 | Northwestern University

Dmitri N. Basov

Dmitri N. Basov (PhD 1991) is a Higgins professor and Chair of the Department of Physics at Columbia University [http://infrared.cni.columbia.edu], the Director of the DOE Energy Frontiers Research Center on Programmable Quantum Materials [since 2018] and co-director of Max Planck Society – New York Center for Nonequilibrium Quantum Phenomena [2018-2030]. He has served as a professor (1997-2016) and Chair (2010-2015) of Physics, University of California San Diego. Research interests include: physics of quantum materials, superconductivity, two-dimensional materials, infrared nano-optics. Prizes and recognitions: Sloan Fellowship (1999), Genzel Prize (2014), Humboldt research award (2009), Frank Isakson Prize, American Physical Society (2012), Moore Investigator (2014, 2020), K.J. Button Prize (2019), Vannevar Bush Faculty Fellowship (U.S. Department of Defense, 2019), National Academy of Sciences (2020).

Toward Programmable Quantum Systems

I will overview some of the recent accomplishments and on-going efforts within our DOE-funded EFRC center on Programmable Quantum Materials: a partnership between Columbia, University of Washington, and Brookhaven National Laboratory. Our work focuses on discovering and controlling emergent quantum phenomena in solid-state platforms and exploring applied aspects of these discoveries. Highlights of our work include: the discovery and systematic investigation of the Fractional Quantum Anomalous effect [*Nature* 622, 63 (2023); *Nature* 622, 74 (2023), *Nature 641, 1149 (2025), Nature 649, 1147 (2026)*], the discovery of nonlinearities in van der Walls materials enabling an efficient generation of entangled photon pairs [*Nature Photonics 16, 698 (2022)*, *Nature Photonics 19, 291 (2025), Nature Photonics 19, 1376 (2025)*], the discovery of deeply subdiffractional waveguides operating at telecom frequencies [*Science 387, 786 (2025)*], and a recent demonstration of purely quantum optical control of superconductivity [*Nature 650, 864 (2026)*]. These and other innovations open pathways toward functional quantum systems: physical platforms in which the uniquely quantum interactions among the constituent elements are engineered to acquire, process and exchange information. I will also discuss some of our recent instrumental innovations that harness entangled photon pairs for nano-scale imaging and spectroscopy.