What is NIST?

The National Institute of Standards and Technology (NIST) is a non-regulatory federal agency within the Department of Commerce. NIST’s mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve our quality of life.

Sensor Science Division

The Sensor Science Division develops and provides national measurement standards and services to advance physical sensor science and technology in optical radiation, temperature, pressure, vacuum, and flow, and related physical phenomena.

Sensor Science Division
Gerald Fraser, Ph.D.
Division Chief
http://www.nist.gov/pml/div685/

Physical Measurement Laboratory
National Institute of Standards and Technology
100 Bureau Drive, Mail Stop 8440
Gaithersburg, MD 20899-8440
Infrared Technology
Advance measurement of infrared radiation for applications in remote sensing, process monitoring, bio-medical imaging, security, and defense.

Cryogenic radiometry
Hyperspectral imaging
Infrared sensors

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Synchrotron Radiation Applications
Characterize optical sensors and radiometric standards; measure ultraviolet and extreme ultraviolet properties of optical materials and their degradation.

Soft x-ray
Radiation damage
VUV and EUV metrology

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Optical properties of materials
Advance measurement of material properties from terahertz to extreme ultraviolet for applications in remote sensing, color, appearance, medical imaging, nano- and microscale science, security, and defense.

Reflectance
Transmittance
Scattering
Emittance
Fluorescence

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Computational modeling of light-matter interactions
Advance the predictive modeling abilities of optical properties of materials; develop improved theories for light-matter interactions.

Scattering
Diffraction
X-ray absorption

Ground and space-based remote sensing
Characterize optical and temperature sensors for remote sensing; advance measurements of physical environmental variables; improve validation methods for space-based measurements.

Sensor calibration
Climate science
Ocean color

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Pressure and vacuum measurement and applications
Develop pressure, vacuum, and small gas flow primary standards and measurement methods for industrial applications.

Outgassing
Vacuum sensors
Process gases
Vapor pressure measurement

Fluid Measurement and applications
Advance measurement of fluid flow, airspeed, liquid density and volume; advance measurement and calculation of thermodynamic and transport properties of gases.

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Measurement science for astronomy
Develop methods for relative and absolute spectroradiometric calibration of ground and space-based telescopes and celestial bodies.

Dark energy
Stellar photometry
Atmospheric Transmittance

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Measurement of greenhouse gas emissions
Improve in-situ and standoff methods for CO$_2$ emissions; develop sensors; improve satellite measurement of emissions and ocean carbon levels.

LIDAR and DIAL
Air monitoring
Gas sensors

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Temperature measurement and applications
Develop contact and non-contact temperature standards; improving ITS-90 scale; realize thermodynamic temperature; advance thermometry applications.

Boltzmann constant
Acoustic thermometry
Radiation thermometry
Noise thermometry

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Metrology for semiconductor manufacturing
Develop methods for defect inspection and optical critical dimension metrology; characterize EUV sources and optics; characterize optical properties of materials for next-generation lithographic techniques.

Holographic microscopy
Optical scatterometry
Extreme UV radiation

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Photometry, colorimetry, and solid-state lighting
Develop methods and standards to support new lighting technology; quantify performance of retroreflective materials; quantify color and appearance.

Light-emitting diodes (LEDs)
Vision science

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Research Opportunities
Postdoctoral fellowships are available at NIST and NIST/NIH through the National Research Council.

International candidates may collaborate with NIST scientists through the guest researcher program.

Undergraduates may participate in the Summer Undergraduate Research Fellowship (SURF) program.

Capabilities
Synchrotron ultraviolet radiation facility
Low background infrared facility
Greenhouse gas emissions test bed
Contact thermometry laboratory
Absolute humidity standards
Hyperspectral imagers and projectors
Spectral responsivity measurement facilities
Spectrally tunable lighting facility
Aperture area measurement facility

www.national-academies.org/rap
www.surf.nist.gov/surf2.htm