msu electroscope group
— a tightly integrated and collaborative group of 16 faculty members together with their graduate students —

— with research spanning multiple disciplines in applied physics ranging from nondestructive evaluation to plasma to classical electromagnetics. Our unique strength lies in building around a comprehensive core — including theory, experiment, and computation — offering decades of collaborative expertise for engineering a better tomorrow.
msu electrosiences group

concept ➤ computation ➤ application

nondestructive evaluation

Electro·magnetics

Algorithms and software for large-scale time and frequency domain electromagnetic analysis

Higher-order integral and differential equation solvers

Light-water reactors; coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.

Electro·magnetics
devices

Theoretical, electronic, transport measurement systems

MOS and optical devices based on phase-change materials

Thermal, electronic, and optical properties of electronic materials

Graphene devices on Fiz substrates.

Light–matter interaction, coupled device electromagnetic models

Theoretical and experimental design of meta-surface, metamaterial-inspired devices (antennas, THz imaging, etc.); optimization of metamaterial structures

Reconfigurable and self-structuring antennas for air and land vehicles

Antenna miniaturization, reconfigurable scatterers, cavities, microwave circuits, and wearable devices

Packaging and high-frequency interconnects, 3D and heterogeneous integration

Measurement of constitutive properties in from the MHz–THz regimes

Scattering from large structures (64 antennas).

Current distributions in 3D fractal structures with 2D periodicity.