**S&T Campaign: Information Sciences**

**Sensing and Effecting**

**Research Objective**
- Develop a technology that traps and measures Raman spectra of aerosol particles from continuously sampled stream.
- Use the technology for the detection and characterization chem/bio agents and atmospheric aerosol particles.

**Challenges**
- Raman spectra are extremely weak.
- Drag forces from air tend to make particles move.
- Trapping particles in air is very difficult, especially from continuous sampling.
- Complex atmospheric aerosols background can confound the detection of chem/bio threat agents.

**ARL Facilities and Capabilities Available to Support Collaborative Research**
- Over 1200 sq. ft. of research space.
- Continuous-wave and pulsed laser sources from deep UV to visible and near IR.
- Spectrographs; image and spectral detectors; microscopes; aerosol trapping devices; and aerosol generators.

- Dual-wavelength single particle fluorescence spectrometer.
- Detection of single particle elastic scattering patterns.
- Single particle Raman spectroscopy for trapped aerosol particles in air.

**Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration**
Seek wide collaborations with universities, research institutes, and governmental agencies; Explore deep understanding of atmospheric aerosol, in particular chem- & bio-aerosol particles.

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**OPTICAL REMOTE SENSING RESEARCH**

**Research Objective**
- Advance and develop new techniques for environmental remote sensing, to include techniques using Doppler LIDAR.
- Advance and develop new techniques to measure the temperature profile of the atmosphere using Stimulated Raman Gain.

**Challenges**
- Compact LIDAR systems with real-time processing with SWAP-C suitable for small airborne platforms has not been fully realized.
- Computationally and energy efficient wind retrieval algorithms.

**ARL Facilities and Capabilities Available to Support Collaborative Research**
- Over 2400 ft² of research space with direct access to outside.
- Multiple Coherent Doppler LIDAR systems.
- Continuous-wave and pulsed laser sources in the visible and near IR.
- Spectrographs; image and spectral detectors, data acquisition systems.

**Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration**
Seek wide collaborations with universities, research institutes, and governmental agencies to expand environmental remote sensing technology capabilities; Explore atmospheric wind flows in complex environments, investigate spectral remote sensing techniques for trace detection of contaminants.

**ACOUSTIC & ELECTRO-OPTIC PROPAGATION RESEARCH**

**Research Objective**
- Development of accurate infrasound propagation models which account for environmental effects.
- Provide realistic atmospheric data cubes for infrasound propagation models from the surface to 180 km AGL.
- Develop models to design and predict performance of novel portable wind screens for infrasound microphones.

**Challenges**
- Incorporation of terrain and large scale turbulence effects into infrasound propagation models.
- Determining source dynamics for the generation of infrasound signals.
- Determining presence of wake vortices from wind screens.

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**Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration**
- Time domain wave propagation modeling over large scale terrain features.
- Large scale wind tunnel with variable turbulence fields.
- Modeling of infrasound sources.
- Temporal variability of atmospheric processes from the surface to 180 km.

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**Atmospheric Sensing Opportunities**

**ARL Facilities and Capabilities Available to Support Collaborative Research**
- Quiet experimental range located in southern Maryland.
- Infrasound propagation models.
- Suite of atmospheric models to generate atmospheric data cubes over the earth.
- Porous fabric domes have been shown to perform very good as wind screens for infrasound sensors.

**Sought in Collaboration**
- Modeling of infrasound sources.
- Time domain wave propagation modeling over large scale terrain features.
- Large scale wind tunnel with variable turbulence fields.
- Development of accurate infrasound propagation models which account for environmental effects.

**Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration**
- Time domain wave propagation modeling over large scale terrain features.
- Large scale wind tunnel with variable turbulence fields.
- Modeling of infrasound sources.
- Temporal variability of atmospheric processes from the surface to 180 km.