

NASA SBIR/STTR Technologies

01.01-9727 - Optoelectronic Infrastructure for RF/Optical Phased Arrays



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Identification and Significance of Innovation

- * Optoelectronic integration enables co-location of RF and optically emitting devices in array formats
- * Planar VCSEL structure enables antiguiding to produce coherent optical beams
- * Beam steering of supermodes by current control in X-Y array
- * Optical distribution of RF by photodetector conversion
- * RF generation by optoelectronic oscillator in a PLL with RF photonic filtering of required harmonic
- * Optical remoting of return signal
- * True time delay by differential group delay for RF beam steering
- * POET is a broad integration platform for multiple NASA applications

Estimated TRL at beginning and end of contract: (Begin: 4 End: 7)

Technical Objectives and Work Plan

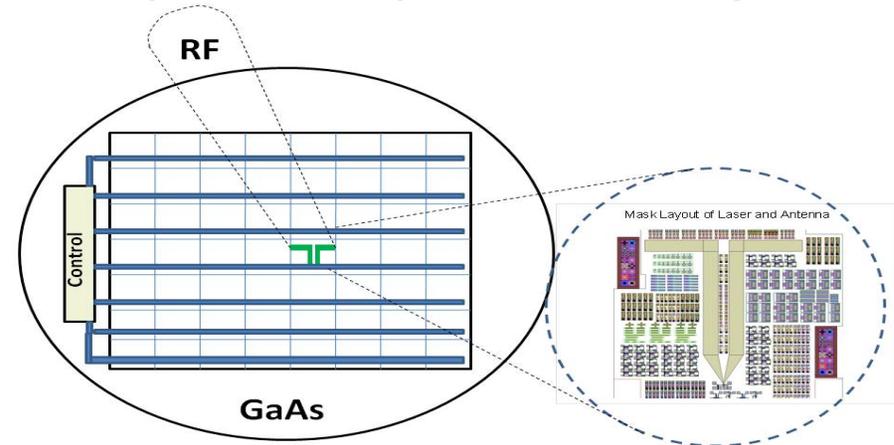
Technical Objectives

- Demonstrate feasibility of combining RF and optical emission from a single aperture
- Demonstrate generation of low phase noise RF using an optoelectronic oscillator
- Demonstrate true time delay RF array steering using micro-resonators to produce differential group delay
- Demonstrate feasibility of optical distribution of RF power and optoelectronic control of beam direction
- Demonstrate 2D optical beam steering from coherent array by current control
- Prove viability of optoelectronic architecture for RF/optical cell

Work Plan

- Develop POET integrated technology to implement RF generation, true time delay, and vertical optical emission
- Develop waveguide technology optical distribution of RF
- Develop anti-guided VCSEL coherent arrays to produce single-mode emission with current steering
- Develop high bandwidth capability for POET transistors modulators, amplifiers and detectors

RF-Optical Shared Aperture Phased Array



NASA Applications

NASA

- * Satellite sensors in the Ka and Ku band for surface, object characterization
- * POET circuits for laser and RF communications, internal satellite networking, RF photonics and AD conversion, high speed systems
- * POET imaging devices for LWIR, THz

Non-NASA Applications

Non-NASA

- * Data comm, FTTH, LANS, Active Optical Cables, high speed servers
- Digital signal processors, FPA's

Firm Contacts

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NON-PROPRIETARY DATA