Disruption Opportunity
DARPA-PA-23-03-09
Photon-Efficient Nanoscale Optical Metrology (PhENOM)

I. Opportunity Description

The Defense Advanced Research Projects Agency (DARPA) Defense Sciences Office (DSO) is issuing a Disruption Opportunity (DO), inviting submissions of innovative basic or applied research concepts in the technical domain of loss-resilient generation, detection, and information-encoding of quantum correlated states of light. This DO is issued under the Program Announcement for Disruptioneering, DARPA-PA-23-03. All awards will be made in the form of an Other Transaction (OT) for Prototype project. The total award value for the combined Phase 1 base (Feasibility Study) and Phase 2 option (Proof of Concept) is limited to $1,000,000. This total award value includes Government funding and performer cost share if required or proposed.

To view the original DARPA Program Announcement (PA) for Disruptioneering, visit SAM.gov under solicitation number DARPA-PA-23-03:
https://sam.gov/opp/718d2f6417d848549394f6248f4fadb9/view

A. Introduction

Optical measurement and control techniques form the backbone of nearly every non-cryogenic platform of sensing, computation, or communication that seeks to attain quantum levels of performance. Despite this wide application landscape and the relatively established methods of generating quantum states of light[1], tangible application instances of quantum-enhanced optical metrology are scarce. This is due to the fact that conventional measurement schemes that seek to leverage squeezed or entangled states of light are invariably thwarted by the presence of optical loss and detection inefficiencies. The rapid degradation of metrological utility with even moderate levels of loss has implied that similar or better measurement precision, accuracy, or resolution can be obtained with classical light sources at higher intensities or longer measurement durations. As such, putative application domains of quantum correlated light have tended to focus on situations that demand extremely low light levels.

The constraints imposed by the ubiquitous presence of optical loss have led to severe limitations in performance and SWaP in several application scenarios of relevance to the DoD. For example, the need for prolonged measurement durations to compensate for detection inefficiencies or loss leads to poor spatio-temporal resolution; the loss of dynamic information in low-light imaging techniques of relevance to medicine and materials science; and to unsustainably slow operating speeds in atom- or ion-based quantum processing architectures. Similarly, the need for higher levels of optical power have limited the widespread deployability or application of a range of solid-state and atomic quantum sensors, and reduced the reliability of quantum-limited optical communication protocols. Additionally, single photon scattering or loss processes can also obscure or overcome weak signals arising from two-photon entangled processes.[2]

[1] S. Pirandola et al, *Advances in photonic quantum sensing*, Nature Photonics 12, 724 (2018); E. Polino et al, *Photonic quantum metrology* ,AVS Quantum Sci. 2, 024703 (2020)
[2] T. Landes et al, *Experimental feasibility of molecular two-photon absorption with isolated time-frequency entangled photon pairs*, Phys. Rev. Res. 3, 033154 (2021); B. P. Hickam et al, *Single-photon scattering can account for discrepancies among entangled two-photon measurement techniques*, J. Phys. Chem. Lett. 13, 4934 (2022)

Alternate paradigms have emerged from the confluence of advances in atomic physics, nanophotonics, and a rapidly growing sophistication in synthesis, nanofabrication, and heterogeneous integration of nonlinear optical architectures. These developments augur disruptive capabilities in quantum optical metrology including the use of Purcell-enhanced quantum emitters for the deterministic generation of novel correlated and multiphoton states of light, new techniques of loss-resilient information encoding for applications ranging from quantum error correction to assured communication protocols, and the quantum-limited collection and detection of light across the electromagnetic spectrum from the millimeter-wave to the X-ray. The Photon-Efficient Nanoscale Optical Metrology (PhENOM) DO seeks to leverage this rapidly growing landscape of strongly interacting light-matter hybrid platforms and architectures to demonstrate new capabilities in loss-resilient and quantum-limited optical measurement and control techniques.

B. Objective/Technical Scope

The PhENOM DO is intended to demonstrate and validate disruptive approaches to the scalable and quantum-limited generation and detection of loss-resilient and correlated states of light. Applications of approaches and techniques explored within PhENOM include efficient, low-light-level imaging across the electromagnetic spectrum; few-photon control and readout of nanoscale solid-state or atomic quantum sensors and qubits for quantum information processing (QIS); and loss-resilient protocols of optical communication, synchronization, and time transfer. Evolutionary improvements to conventional optical detection techniques; techniques of generating correlated photon states that do not offer enhanced resilience to single-photon scattering or loss processes; or techniques that are limited in scalability may be deemed out of scope. In order to enable the assessment of subsequent application-oriented scalability, this solicitation requires successful proposals to demonstrate the loss-resilient generation, detection, and information-encoding of at least 10^6 correlated or multi-photon states per second.

As an anticipated outcome of this DO, successful proposals supported by this solicitation will contribute to the development of conceptual roadmaps, feasibility analyses, application studies, and proofs-of-concept demonstrations of the quantum-limited generation and detection of correlated, multiphoton, and loss-resilient optical states that enable new regimes of quantum-limited imaging, communication, and QIS. It is possible that such analyses and demonstrations could inform and support future concepts of broader scope on the mission-oriented development of these techniques in the domains of non-invasive and high resolution biomedical imaging, assured communications, low-SWaP quantum-enhanced sensors, and scalable architectures for quantum information processing.

C. Structure

Proposals submitted in response to this DO must be unclassified and must address two independent and sequential project phases: a Phase 1 Feasibility Study (base) and a Phase 2 Proof of Concept (option). The periods of performance for these phases are 12 months for the Phase 1 base effort and 12 months for the Phase 2 option effort. Combined Phase 1 base and Phase 2 option efforts for this DO should not exceed 24 months. The Phase 1 (base) award value is limited to $350,000. The Phase 2 (option) award value is limited to $650,000. Both Phase 1 and Phase 2 value limits include performer cost share, if required or if proposed. The total award value for the combined Phase 1 and Phase 2 is limited to $1,000,000. This total award value includes Government funding and performer cost share, if required or if proposed.

Decisions regarding which performers will continue to Phase 2 will be based on the results of

Phase 1 and the likelihood that disruptive outcomes and new capabilities in loss-resilient optical measurement, quantum-limited imaging, and/or few-photon quantum control techniques will result from the completion of Phase 2. Funding availability will also be a decision factor.

D. Technical Area Description

Quantum optical metrology has, to date, almost exclusively relied on quantum enhancements via squeezed or two-photon entangled states. While these states can be generated within weakly nonlinear optical materials in a relatively straightforward manner, their metrological utility is highly sensitive to loss, inefficient detection, and other nonidealities. Yet, it should be noted that such states comprise only a small fraction of the diverse range of correlated quantum photonic states that can be realized by harnessing stronger light-matter interactions. Achieving the regime of strong, tunable optical nonlinearities can enable entirely new avenues in photonic quantum information science – in effect, going beyond weakly correlated photonic states to a regime in which light is endowed with matter-like attributes leading to the formation of multi-photon bound states, photonic quantum fluids, and other strongly correlated photonic states.[3] A growing body of theoretical and experimental studies have demonstrated the accessibility of strongly coupled light-matter hybrids using nanophotonic, nanoplasmonic, and other Purcell-enhanced platforms.[4]

Laboratory-scale proofs-of-concept demonstrations of such platforms, although limited by weak optical nonlinearities and poor scalability, have nevertheless demonstrated a wide range of such quantum correlated photonic states ranging from multi-photon bound states with tunable interactions,[5] topological states of light,[6] photon switching and control mediated by single atoms,[7] and new forms of light-matter excitations with novel correlations. In parallel, Purcell-enhanced atom-light platforms and nanophotonic architectures have also been used to demonstrate photon-efficient detection and control of quantum emitters, qubits, and quantum sensors.[8] Extending these foundational demonstrations to more integrated, scalable, and strongly nonlinear architectures[9]

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[3] D. Roy et al, *Colloquium: Strongly interacting photons in one-dimensional continuum*, Rev. Mod. Phys. 89, 021001 (2017)

[4] See, for example, D. Dovzhenko et al, *Light-matter interaction in the strong coupling regime: Configurations, conditions, and applications*, Nanoscale, 10, 3589 (2018); R. Liu et al, *Strong light-matter interactions in single open plasmonic nanocavities at the quantum optics limit*, Phys. Rev. Lett. 118, 237401 (2023)

[5] See, for example, O. Firstenberg et al, *Attractive photons in a quantum nonlinear medium*, Nature 502, 71 (2013); Q. Liang et al, *Observation of three-photon bound states in a quantum nonlinear medium*, Science 359, 783 (2018);

[6] See, for example, S. Mittal et al, *A topological source of quantum light*, Nature 561, 502 (2018); J. Deng et al, *Observing the quantum topology of light*, Science 378, 966 (2022); J. Tambasco et al, *Quantum interference of topological states of light,* Sci. Adv. 4; eaat3187 (2018)

[7] See, for example, B. Dayan et al, *A photon turnstile dynamically regulated by one atom*, Science 319, 1062 (2008); T. Tiecke et al, *Nanophotonic quantum phase switch with a single atom*, Nature 508, 241 (2014)

[8] See, for example, J. Bochmann et al, *Lossless state detection of single neutral atoms*, Phys. Rev. Lett. 104, 203601 (2010); M. L. Terraciano et al, *Photon burst detection of single atoms in an optical cavity*, Nature Phys. 5, 480 (2009); Y. Kurman et al, *Photonic-crystal scintillators: Molding the flow of light to enhance X-ray and γ-ray detection*, Phys. Rev. Lett. 125, 040801 (2020); C. Roques-Carmes et al, *A framework for scintillation in nanophotonics*, Science, 375, 6583 (2022); R. Katsumi et al, *Design of an ultra-sensitive and miniaturized diamond NV magnetometer based on a nanocavity structure*, Jpn. J. Appl. Phys. 61, 082004 (2022)

[9] See, for example, J. Kim et al, *Hybrid integration methods for on-chip quantum photonics*, Optica 7, 291 (2020); Y. Arakawa et al, *Progress in quantum-dot single photon sources for quantum information technologies*, Appl. Phys. Rev. 7, 021309 (2020); S. Buckley et al, *Engineered quantum dot single photon sources*, Rep. Prog. Phys. 75, 126503 (2012); R. Uppu et al, *Quantum-dot-based deterministic photon-emitter interfaces for scalable photonic quantum technology*, Nature Nano 16, 1308 (2021)

should enable disruptive avenues of photonic quantum metrology, including the deterministic generation of highly correlated and loss-resilient quantum light, photon-efficient manipulation and control of quantum emitters and qubits, quantum-limited imaging, and new capabilities for resilient information encoding within photonic states.[10]

The PhENOM DO is interested in the loss-resilient generation, detection, and information-encoding of nonclassical and quantum-correlated photonic states that harness these emerging capabilities of nanophotonic and integrated photonic architectures, scalable cavity-enhanced platforms, and strongly interacting light-matter hybrid architectures. Innovative concepts within the following areas are in scope of this solicitation:

- Correlated photon generation: Topics of interest in this area include the use of Purcell-enhanced quantum emitters for the generation of correlated photonic states such as multiphoton bound states and strongly interacting 'photon fluids' that may enable robust, loss-resilient sensing, imaging, and quantum control capabilities. Proposals in this focus area must include a quantitative discussion of relevant metrics including the brightness, spectral purity, and scalability of the device concept. Phase 1 efforts should include the design and theoretical analysis of photon generation, distillation, or purification schemes for the high fidelity generation of the proposed correlated photonic states. Phase 2 efforts will involve the experimental demonstration of the proposed device concept guided by Phase 1 efforts.
- Photon-efficient detection: Topics of interest include scalable techniques for photon-efficient and loss-resilient detection techniques across the electromagnetic spectrum for applications including low-light-level and quantum-limited imaging; high fidelity, few-photon quantum state measurement; and resource-efficient control of qubits and quantum sensors. Proposals must include (as applicable) a quantitative discussion of relevant metrics, including the detection efficiency, spatio-temporal imaging resolution, fidelity, and speed of quantum state detection and/or control protocols. Proposals should also include a discussion of the scalability of the proposed concept. Phase 1 efforts should include the design and analysis of the detection, imaging, and/or quantum control protocols. Phase 2 efforts will involve the experimental demonstration of these proposed detection techniques guided by Phase 1 efforts.
- Loss-resilient information encoding: Topics of interest include novel and loss-resilient techniques of information encoding in photonic states for applications ranging from resource-efficient quantum control techniques; few-photon quantum state measurement; and assured, loss-resilient communications protocols. Proposals must include (as

[10] See, for example, A. Javadi et al, *Single-photon non-linear optics with a quantum dot in a waveguide*, Nature Comm. 6, 9655 (2015); M. Cosacchi et al, *N-photon bundle statistics in different solid-state platforms*, Phys. Rev. B 106, 115304 (2022); F. Xing et al, *Deterministic generation of arbitrary n-photon states in an integrated photonic system*, arXiv:2305.09878 (2023); C. Groiseau et al, *Proposal for a deterministic single-atom source of quasisuperradiant photon pulses*, Phys. Rev. Lett. 127, 033602 (2021); J. Kim et al, *Proposal for chip-scale generation and verification of photonic dimers*, Appl. Phys. Lett. 119, 224001 (2021); H. Jeannic et al, *Dynamical photon-photon interaction mediated by a quantum emitter*, Nature Phys. 18, 1191 (2022); S. Ma et al, *Antibunched N-photon bundles emitted by a Josephson photonic device*, Phys. Rev. Res. 3, 043020 (2021); P. Bienas et al, *Coherent optical nanotweezers for ultracold atoms*, Phys. Rev. A, 102, 013306 (2020); A. Orioli Pineiro et al, *Emergent dark states from superradiant dynamics in multilevel atoms in a cavity*, Phys. Rev. X 12, 011054 (2022)

applicable) a description of the encoding scheme, potential application domains, and a quantitative analysis of how the proposed protocols may enable greater resilience or tolerance to conventional forms of loss or detection inefficiencies that limit conventional optical encoding schemes. Phase 1 efforts should include the design and analysis of the proposed encoding scheme. Phase 2 efforts will involve the experimental demonstration of these protocols guided by Phase 1 efforts.

Successful proposals must be able to demonstrate the loss-resilient generation, information-encoding, and detection of at least 10^6 correlated or multi-photon states per second. Proposals should contain a clear justification of how the proposed efforts will yield transformative or disruptive benefits over the current SoA and, in particular, discuss their proposed concept in the context of how it may enable photon-efficient measurements, quantum control, or loss-resilience beyond what can be currently achieved through conventional techniques. Technical considerations and limitations of the current SoA including effects of single-photon scattering and loss; detection inefficiencies; concomitant effects on measurement sensitivity, bandwidth, and quantum efficiency; SWaP considerations; and scalability should be analyzed in relation to the proposed concept to justify its disruptive potential. Proposals should also include a discussion of application domains in which their proposed concept may yield disruptive advances beyond the current SoA.

During Phase 1, successful teams will develop the conceptual modeling, theoretical analyses, design, and/or preliminary experimental demonstrations of their proposed concept. The goal of the Phase 1 efforts should be to develop and refine models, metrics, and performance predictions for the photon-efficient generation, detection and/or information encoding schemes (as applicable) that will guide the experimental efforts that will commence in Phase 2. These efforts should be aligned with the Schedule of Milestones described below (see I.E. for the Schedule of Milestones). During Phase 2, successful teams will build upon their Phase 1 efforts to realize experimental demonstrations of their concepts in accordance with the proposed metrics. These efforts should be validated via characterization of their proposed protocols with the requisite figures of merit as relevant to their proposed concept (see I.E. for the Schedule of Milestones).

E. Schedule/Milestones

Proposers must address the following fixed payable milestones in their proposals. Proposers must complete the "Schedule of Milestones and Payments" Excel Attachment provided with this DO to submit a complete proposal and fulfill the requirements under Volume 2, Price Volume. If selected for award negotiation, the fixed payable milestones provided will be directly incorporated into Attachment 3 of the OT agreement ("Schedule of Milestones and Payments"). Proposers must use the Task Description Document template provided with the Program Announcement DARPA-PA-23-03, which will be Attachment 1 of the OT agreement.

Phase 1 fixed milestones for this program must include, at a minimum, the following:

- Month 1: Kick-off meeting presentation with description of proposed Phase 1 effort to include the description of proposed concept, focus area, and potential application domain; Justification of proposed approach based on preliminary analyses or modeling; Justification of the benefits of the proposed scheme in achieving beyond-SoA loss-resilience in the potential application domain; Description and preliminary analyses of the proposed concept metrics that will be achieved during the period of performance, and comparison of these metrics to the current SoA. All supporting positions identified in the proposal are assigned to personnel, and names are provided to the Government.

- Month 4: Interim report of preliminary analysis of proposed experimental protocols to include (as applicable) analysis of properties of the generated correlated photonic states such as brightness, photon flux, quantum statistical measures that may characterize the correlated photon source, etc. and comparison of these metrics to the SoA; analysis of loss-resilient detection schemes with figures of merit such as quantum efficiency, fidelity, measurement bandwidth, spectral and/or temporal resolution, and comparison of these metrics to the SoA; analysis of robust information encoding schemes to include estimates of appropriate measures of loss-resilience relevant to the proposed application domain. All proposed personnel must be working on the effort at the planned level of effort.
- Month 8: Interim report containing description and analyses of proof-of-concept simulations, models, and/or experimental results (as applicable).
- Month 12: Comprehensive final report describing Phase 1 results; Comparison of the achieved and/or proposed metrics against the current SoA; Discussion of proposed Phase 2 efforts informed by Phase 1 results and a comparison of proposed Phase 2 metrics to the relevant SoA.

Phase 2 fixed milestones for this program must include, at a minimum, the following:

- Month 13: Report containing preliminary description of Phase 2 effort to include details of experimental implementations and analyses to be pursued; details of how these Phase 2 efforts were informed by the results of Phase 1 efforts; description of any modifications to originally proposed metrics; and description of proposed measurement, characterization, or validation techniques to be implemented during Phase 2 efforts.
- Month 16: Interim report containing description and analyses of experimental or analytic efforts to include (as applicable) details and progress of the hardware implementation; noise or error analyses; performance metrics, preliminary data and their analyses, and comparison of the proposed implementations to the SoA.
- Month 20: Interim progress report containing description and analyses of simulations, models and/or experimental characterization (as applicable) of proposed concept on loss-resilient generation, detection, or encoding of optical states (as applicable) with the relevant measurements, estimates, and analyses of the metrics relevant to the proposed concept.
- Month 24: Final report providing a comprehensive discussion of theoretical calculations, simulations, and experimental data accumulated over the Phase 1/2 efforts.

For planning and budgetary purposes, proposers should assume a program start date of May 20, 2024. Schedules will be synchronized across performers, as required, and monitored/revised as necessary throughout the program's period of performance.

All proposals must include the following meetings and travel in the proposed schedule and costs:

- To foster collaboration between teams and disseminate program developments, a two-day virtual Principal Investigator (PI) meeting will be held approximately every six months.
- Regular teleconference meetings will be scheduled with the Government team for progress reporting and problem identification and mitigation. Proposers should also anticipate at least one site visit per phase by the DARPA Program Manager, during which they will have the opportunity to demonstrate progress towards agreed-upon milestones.
- Conference and publication costs should not be included.

F. Deliverables

Performers will be expected to provide, at a minimum, the following deliverables:

- Negotiated deliverables specific to the objectives of the individual efforts. These may include registered reports whose contents may include, but are not limited to, theoretical analyses, numerical models, simulations, experimental protocols and data, publications, and/or a comprehensive assemblage of design documents, models, theoretical analyses, experimental data and analyses.

II. Award Information

Selected proposals that are successfully negotiated will result in the award of an OT for Prototype project. See Section 3 of DARPA-PA-23-03 for information on awards that may result from proposals submitted in response to this announcement.

Proposers must review the model OT for Prototype agreement provided as an attachment to DARPA-PA-23-03 prior to submitting a proposal. DARPA has provided the model OT to expedite the negotiation and award process and ensure DARPA achieves the goal of Disruptioneering, which is to enable DARPA to initiate a new investment in less than 120 calendar days from idea inception. The model OT is representative of the terms and conditions that DARPA intends to include in all DO awards. The task description document, schedule of milestones and payments, and data rights assertions requested under Volumes 1, 2, and 3 will be included as attachments to the OT agreement upon negotiation and award.

Proposers may suggest edits to the model OT for consideration by DARPA and provide a copy of the model OT with track changes as part of their proposal package. DARPA may not accept suggested edits. The Government reserves the right to remove a proposal from award consideration should the parties fail to reach an agreement on OT award terms and conditions. If edits to the model OT are not provided as part of the proposal package, DARPA assumes that the proposer has reviewed and accepted the award terms and conditions to which they may have to adhere and the model OT agreement provided as an attachment, indicating agreement (in principle) with the listed terms and conditions applicable to the specific award instrument.

To ensure that DARPA achieves the Disruptioneering goal of an award within 120 calendar days from the posting date (January 25, 2024) of this announcement, DARPA reserves the right to cease negotiations when an award is not executed by both parties (DARPA and the selected organization) on or before May 20, 2024.

III. Eligibility

See Section 7 of DARPA-PA-23-03 for information on who may be eligible to respond to this announcement.

IV. Disruption Opportunity Responses

A. Proposal Content and Format

All proposals submitted in response to this announcement must comply with the content and format instructions in Section 5 of DARPA-PA-23-03. All proposals must use the templates provided as Attachments to DARPA-PA-23-03 and the “Schedule of Milestones and Payments” Excel Attachment provided with this DO and follow the instructions therein.

Information not explicitly requested in DARPA-PA-23-03, its Attachments, or this announcement may not be evaluated.

B. Proposal Submission Instructions

Responses to DARPA-PA-23-03-09 shall be submitted electronically to DARPA's Broad Agency Announcement (BAA) Portal (https://baa.darpa.mil).

DARPA will acknowledge receipt of complete submissions via email and assign identifying numbers that should be used in all further correspondence regarding those submissions. If no confirmation is received within two (2) business days, please contact PhENOM@darpa.mil to verify receipt.

When planning a response to this DO, proposers should take into account the submission time zone and that some parts of the submission process may take from one (1) business day to one month to complete (e.g., registering for a SAM Unique Entity ID (UEI) number or Tax Identification Number (TIN)).

Electronic Upload

First-time users of the DARPA BAA Portal must complete a two-step account creation process. The first step consists of registering for an extranet account by going to the URL above and selecting the "Account Request" link. Upon completion of the online form, proposers will receive two separate emails; one will contain a username and the second will provide a temporary password. Once both emails have been received, the second step requires proposers to go back to the submission website and log in using that username and password. After accessing the extranet, proposers may then create a user account for the DARPA Submission website by selecting the "Register your Organization" link at the top of the page. Once the user account is created, proposers will be able to see a list of solicitations open for submissions, view submission instructions, and upload/finalize their proposal.

Proposers who already have an account on the DARPA BAA Portal may log in at https://baa.darpa.mil, select this solicitation from the list of open DARPA solicitations and proceed with their proposal submission. Note: proposers who have created a DARPA Submission website account to submit to another DARPA Technical Office's solicitations do not need to create a new account to submit to this solicitation.

All full proposals submitted electronically through the DARPA Submission website must meet the following requirements: (1) uploaded as a zip file (.zip or .zipx extension); (2) only contain the document(s) requested herein; (3) only contain unclassified information; and (4) must not exceed 100 MB in size. Only one zip file will be accepted per full proposal. DARPA will reject full proposals not uploaded as zip files. Technical support for the DARPA Submission website is available during regular business hours, Monday – Friday, 9:00 a.m. – 5:00 p.m. Requests for technical support must be emailed to BAAT_Support@darpa.mil with a copy to PhENOM@darpa.mil. Questions regarding submission contents, format, deadlines, etc., should be emailed to PhENOM@darpa.mil. Questions/requests for support sent to any other email address may result in delayed/no response.

Since proposers may encounter heavy traffic on the web server, DARPA discourages waiting until the day proposals are due to request an account and/or upload the submission. Note: Proposers submitting a proposal via the DARPA Submission site MUST (1) click the "Finalize" button for the submission to upload AND (2) do so with sufficient time for the upload to complete prior to the deadline. Failure to do so will result in a late submission.

C. Proposal Due Date and Time

Proposals in response to this announcement are due no later than 4:00 p.m. on March 21, 2024. As described in Section 5 of DARPA-PA-23-03, full proposal packages must be submitted per the instructions outlined in this DO *and received by DARPA* no later than the above time and date. Proposals received after this time and date may not be reviewed.

Proposers are warned that the proposal deadline outlined herein is in Eastern Time and will be strictly enforced. When planning a response to this announcement, proposers should consider that some parts of the submission process may take from one (1) business day to one (1) month to complete.

V. Proposal Evaluation and Selection

Proposals will be evaluated and selected in accordance with Section 6 of DARPA-PA-23-03. Proposers will be notified of the results of this process as described in Section 7.1 of DARPA-PA-23-03.

VI. Administrative and National Policy Requirements

Section 8.2 of DARPA-PA-23-03 provides information on Administrative and National Policy Requirements that may be applicable for proposal submission and performance under an award.

VII. Point of Contact Information

Dr. Mukund Vengalattore, Program Manager, DARPA/DSO, PhENOM@darpa.mil

VIII. Frequently Asked Questions (FAQs)

All technical, contractual, and administrative questions regarding this announcement must be emailed to PhENOM@darpa.mil. Emails sent directly to the Program Manager or any other address may result in delayed or no response.

All questions must be in English and must include the name, email address, and telephone number of a point of contact. DARPA will attempt to answer questions publicly in a timely manner; however, questions submitted within seven (7) calendar days of the proposal due date listed herein may not be answered.

DARPA will post an FAQ list under the DO on the DARPA/DSO Opportunities page at (http://www.darpa.mil/work-with-us/opportunities). The list will be updated on an ongoing basis until one (1) week before the proposal due date.