

POPA Report Proposal v2.6

POPA Report Title:

Missile Defenses and National Security

POPA Proposer Name & Contact Information:

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POPA Topical Area (select one):

- Energy & Environment;
- Ethics;
- National Security;
- Physics & the Public;
- To be determined

Objective: *Describe goals and examples of envisioned actionable recommendations.*

The purpose of this study is to produce an educational report that will contribute to the safety and security of the United States and the world. This unclassified report will provide technically-informed, accurate, and readily understandable analyses and critiques of selected elements of the U.S. anti-missile weapons program, to support informed discussion and decisions by members of the American Physical Society, members of Congress, officials in the Executive Branch, and the general public. The report will focus on weapons intended to disable or destroy attacking nuclear-armed intercontinental ballistic missiles (ICBMs) in flight. Our aim is to produce a report that will help shape coming decisions in ways that will make the U.S. anti-missile weapons program less dangerous, less wasteful, and more effective. For this effort to be successful, it will be important for the APS to devote a substantial effort to communicating the results of the study to its intended audience in a wide variety of ways, such as articles in newspapers and magazines, Congressional and Executive Branch Agency briefings, talks at APS meetings, and presentations at public meetings.

Motivation and Background: *Identifies the relevance of the work to the APS, and (if relevant) how the study relates to previous POPA or other public studies.*

The January 2019 Missile Defense Review called for major expansions of existing elements of the U.S. anti-missile weapons program and mandated exploration of new anti-missile weapons, including weapons for boost-phase intercept of ICBMs that were the subjects of important APS studies in 1987 and 2003. Further actions to expand the program are expected. The resulting program would be even larger, more complex, and more expensive than it already is. The current program's budget is more than ten

billion dollars per year and is growing. The Ground-based Midcourse Defense system is, by itself, expected to cost at least 70 billion dollars, making it one of the four largest military projects ever funded. The missile defense program has significant technical aspects that can be evaluated by scientists but are not currently well-understood by the public or many policymakers. Furthermore, missile defense is one of the few programs whose national security policy implications depend crucially on *perceptions* of its technical performance and future capabilities. In the past, the physics community has provided timely information on missile defense. The primary motivation for this study is to encourage and support a thoughtful, technically-informed public discussion of these issues.

Opportunity: *Provides a clear, detailed exposition that justifies POPA interest in the proposed study at this time.*

Recurring public statements by many government officials indicate that they do not understand the known present capabilities and expected near-term capabilities of the U.S. weapons intended to disable or destroy attacking ICBMs in flight. Inasmuch as having sound national security policies relies on having a sound understanding of these capabilities, and because the United States is considering making significant further investments in these weapons, we believe that the time is ripe for the APS to perform an educational service. The proposed report will help interested parties understand the technical challenges and opportunities presented by the systems that are intended to defend against ICBMs, and their implications for national security policies. Our goal is to help assure that these policies are based on a sound technical footing. We believe that engagement by the physics community with the issues surrounding current and proposed defenses against ICBMs will lead to a safer and perhaps less wasteful world. This is the opportunity this study would seize.

Approach / Plans: *Describes the planned study in a manner that indicates the envisioned progression of the work over the duration of the proposed study.*

The report would focus on current and proposed U.S. anti-ICBM weapons, be primarily factual and analytical rather than advocative, and have a substantial technical component.

In preparing its report, the study group would not perform any original research, but would instead draw on existing authoritative studies and reports, including UCS studies of the anti-ballistic missile program, the 2003 APS Study of boost-phase intercept weapons, unclassified summaries of the 2011 Defense Science Board and 2012 National Research Council reports, many Government Accountability Office reports, Defense Director of Operational Test and Evaluation and Congressional Research Service reports, Congressional testimony from experts, and the technical expertise that exists within the physics community.

A report that clarifies important technical aspects of particular elements in the existing and currently proposed U.S. anti-missile weapons program could make a valuable contribution to better informing APS members, the public, members of Congress, and

Executive Branch officials about these aspects. However, we need to recognize at the outset that, as far as U.S. security is concerned, some of the most important questions raised by these program elements are not entirely technical questions nor even questions of resource allocation, but are instead questions about the broader effects on U.S. security of developing, testing, and deploying these weapons. Although a POPA report cannot explicitly advocate particular actions or policies, we think that it can, and must, mention the possible wider implications of particular anti-missile weapons and programs, many of which have significant security risks.

A central element of the report will be descriptions and assessments of several specific anti-missile weapon systems that are being deployed or have been proposed, including discussions of the technical and policy issues associated with each. At present, we suggest focusing on four illustrative anti-ICBM systems or programs:

- The Ground-based Midcourse Defense system, which is the only system for intercepting ICBMs that is currently deployed and which has had one operational test
- The Aegis-at-sea and Aegis-ashore systems, which are currently designed to intercept medium- and intermediate-range ballistic missiles but are being upgraded and have been suggested as possible supplements to the GMD system.
- Space-based kinetic-kill boost-phase interceptors, which is a proposed system
- Drone-based kinetic-kill boost-phase interceptors, which is a proposed system

Topics that will be considered will include technical assessments of the performance of these systems and their anticipated costs, both of which must be clearly understood in order for members of the public and government officials to make appropriate decisions. The report's technical and cost assessments will be based on existing authoritative studies and reports, augmented by additional information that has become available since these reports were published.

Participants: *Lists necessary participants & institutions, and describes the importance of the key participants towards achieving the goal of a completed study.*

In addition to the proposed chair (Fred Lamb) and POPA co-chairs (Laura Grego, James Wells), we are in discussions with several other expert members of the community to participate in the assessments and report writing should this study be approved.

We plan to engage a wide variety of experts to review the report once it is completed but before it is finalized, as is common for a POPA report. We plan to consult not only technical experts in the missile defense realm, but also experts in political science, military affairs, and diplomacy who have experience in debates about missile defense policy, to ensure that our report reads as balanced and accurate.

Deliverables: *Should include description and delivery dates for specific milestones (e.g., workshop), decision points, and draft report for consideration by POPA.*

If the study is approved at the February 2020 POPA meeting, at the June 2020, October 2020, and February 2021 POPA meetings we will report our progress in meeting the following milestones:

June 2020: An update will be provided to POPA on the progress of the study, including the final study group membership and any issues or developments that have come to light between the February and June 2020 POPA meetings and would affect our report.

October 2020: A first draft of the full report will have been completed and sent out for external review. This draft will also be available to POPA members, so they can read it and provide advice.

February 2021: Revisions based on the reports of the external referees and feedback from POPA members will have been completed, and the final report will be up for discussion and a vote by POPA.

Post-February 2021: A significant effort will be made to disseminate the report to APS members, the public, Congress, and Executive Branch officials. The report will be made available to the APS Nuclear Threat Reduction Advocacy project being led by Stewart Prager.

Duration and Funding: *Provides estimated length of study from initiation to draft report delivery, and associated funding needed to achieve each of the deliverables.*

NOTE: Completion within one year of approval is desired.

The duration of this study is estimated to be one year, with a final report to be provided for consideration at the February 2021 POPA meeting. We request \$25,000 funding for the report, which will be used to assemble and consult experts on various aspects of missile defense to advise our work and review our findings, and to aid in the initial dissemination of the report once it is completed.

POPA Reports provide the opportunity for physicists to respond in a thoughtful and timely manner to pending policy issues. The reports are sharply defined, limited to roughly 25 pages, completed in approximately one year, build on existing APS Policy Statements, and provide actionable policy recommendations. POPA Reports are unclassified, so as to allow for broad public discussion of the topic. Since they are restricted to providing elucidations of existing APS positions, they do not require the APS Council approval. However, they are subjected to independent review and APS Executive Board approval before they can be issued. An APS Study, by contrast, is a more substantial examination of a technical issue, is not limited in length, can explore new policy areas, and requires APS Council approval.