

Transformative STEM Subjects and More

The Honorable Arden L. Bement, Director, NSF

Dr. Bement,

I request to brief you and other distinguished experts from the NSF and other Offices on a seminal work in physics, engineering and mathematics that will have profound and instant impact on our economy, education, national security and leadership in science and technology. A short briefing will give clear-cut evidence of a transformative Work that will greatly alter our knowledge in physics, engineering, mathematics, philosophy of science and other important subjects.

In your March 2009 talk at Tulane University, you said, *“The nation is always eager for another ‘giant step’ like putting a man on the moon... I would love to be able to announce that another such development is imminent.”* The Work I will bring to the NSF is a giant step in classical and modern physics, engineering and mathematics. My Work is not only imminent; it is complete and ready to use. Millions of students, educators, and practitioners will want to get to work on it immediately. As you might remember, I got involved in science and technology controversies before, such as, the Space Shuttle Challenger investigations and the cold fusion subject. Your leadership and guidance and the NSF expertise will help to avoid the messy proceedings that surrounded those and other subjects. Also, the Work is vital to programs initiated by President Barak Obama to get America back on track.

I request that my briefing(s) be considered “White Paper(s)” for follow-up proposals. I am the sole proprietor of the information to be presented. My health and other circumstances preclude other actions now, including publications of any sort. Also, the unique and historic nature of the Work and the problems we face to day (as identified by the National Academies, GAO, NSF, and others) require more the wisdom of our leaders and their immediate action. I tried to get funding to complete the above Work from many Offices in the last three decades, but my requests were rejected.

I had shared elements that could lead to the present Work with hundreds of experts who attended my Continuing Engineering Education Programs at my *alma mater*, the George Washington University, and elsewhere, and Lecture Tours sponsored by the Royal Scientific Society (RSS) of Jordan and the UNDP in the 1980s and 90s. My Programs received great praise from attending scientists and engineers. Regrettably, my Programs were cut short by interference from NASA and others, my papers submitted for publication openly blocked, some works plagiarized, and other works buried. Yet many top experts from DOD, NASA itself, the aerospace communities and academia recognized the previous works in writing, and I was honored to have your written approval many years ago now. Based on many past experiences, I find it imperative to find ways to secure proprietorship of the present unique and historic Work. I hope the NSF, the RSS, and other Offices will help in this matter and to get vital STEM and other information into the market quickly. This is consistent with the effort of the President and his Teams to rebuild our industries, education, economy, and national security.

What Is The Present STEM Work All About?

There is a conspicuous “knowledge gap” between the Galilean-Newtonian mechanics and modern energetics. This is the sudden jump taken from the concept of force to the energy conservation principle, which should be familiar to all physicists and engineers. According to the textbooks,

the sudden jump is taken to simplify problem solving. But failing to bridge the “gap,” 20th century classical physics remained incomplete and modern physics lacked a vital cornerstone in its development. The last serious attempts to bridge the gap were taken by Hertz, Mach and Boltzmann at the end of the 19th century, but as noted by Einstein, Poincare and others, the central problems were not resolved. The basic blocks to bridge the “gap” were available to great 17th century scientists, including Hooke, Newton, and Leibniz, but the “gap” was left undone. Although great advances were made in physics and mathematics in the 18th and 19th centuries, the Bernoulli’s, D’Alembert, Laplace, Lagrange, Fourier and other mathematicians of the time did not resolve the “knowledge gap.” The “incomplete physics” devastated 20th century technology and, I dare say, led to the present serious problems, recently recognized by everyone, in the design, procurement, cost, schedule, operation and maintenance of modern defense, aerospace and other systems. I addressed some of these issues in my GWU Engineering Program, “*Anatomy of Failure Mechanisms in Modern Defense and Aerospace Systems*,” in 1989. My present Work fills the “knowledge gap” and more.

More What?

The present Work began with intensive studies in mathematics, technology and philosophy in Jordan in the 1950s. My late father and competent educators guided and supported my study of Hellenic and Hellenistic thinkers, Arab-Muslim and Medieval Latin Scholastics, the Moderns and others. While working to bridge the above “knowledge gap” in the next decades, a valuable byproduct resulted. Mathematical solutions to important Ideas in the great tradition of western thought became apparent. The Ideas include Plato’s dialectic and theory of forms, the ancient problem of opposites, especially, “the one and many” and “the universal and particular,” and Aristotle’s theories of change, dunamis, and entelechia. I am now able to show how these long cherished concepts are related to modern STEM subjects, and how the latter are related to the former – mathematically. For thousands of years no one was able to do the arithmetic, geometry and algebra of the important concepts. The lack of mathematical solutions led to the estrangement of philosophy from science, e.g., Linguistic Philosophy in the 19th century and Logical Positivism in the 20th century divorced science, particularly physics, from philosophy. Yet, some of the great founders of modern physics continued to think in terms of the above great Ideas, e.g., Einstein writing about his “*attempts to give tangible form*” to modern physical concepts. The benefits of this part of my Work will spill over from pure STEM subjects to other important topics in the liberal arts. I am also prepared to speak about these subjects at once.

STEM (Science, Technology, Engineering and Mathematics) Transformative Works:

1. Another Fundamental Principle of Superposition of Motion
2. On the Law of Conservation of Energy
3. On Action-Reaction

Related (Mathematical) Philosophy of Science Works:

1. Plato’s Dialectic and Theory of Forms
2. Mathematics of “the One and Many” and the other Opposites
3. Aristotle’s Theories of Change, Dunamis, and Entelechia

Please note that I do not seek funds to do the above Work. My Work is complete, and I have been eager to share it with others, particularly, to the benefit of our Nation. I hope the NSF will spearhead the effort to identify and develop actions on many fronts, including, education and science and technology research. The NSF is also better placed to integrate my Work into President Obama's Recovery and Reinvestment Act, the Budget and other Programs to determine the best ways to benefit our Nation in the short- and long-terms, and to advise the Administration and the Congress on a scientific-technical-mathematical-philosophical subject of great breadth, depth and consequence.

Dr. Bement: The above Work is going to be a big headache, especially, to the NSF. The tests, the mathematics, and the rationale are straightforward. It will become quickly apparent to everyone that some basic concepts in physics and engineering must be altered, new concepts must be developed, and old concepts must be revised or abandoned. Many questions arise:

- How will Physics and Engineering textbooks be changed?
- How will advanced textbooks be changed?
- How will curricula changes be handled?
- Who will make the changes?
- When?
- And, how?
- What guidelines will be used?
- Who will develop the guidelines?

The concepts involved are everywhere in the K-12 books.

- How do we change millions of books?
- Do we start with pamphlets, supplements, addenda and other add-ons?
- Who will prepare, edit and check the accuracy of the concepts that will form the knowledge foundation of future generations?

All future specification, statements of work, procurement and design of aircraft, spacecraft, launch vehicles, industrial facilities, bridges, buildings and other systems must incorporate new "dynamics principles," hitherto completely unknown. Many existing systems will require reevaluation to enhance safety, useful life and economy of operation and maintenance. Budgets, priorities, and actions will be different for different groups, e.g., DOD, DOE, DOT, DOC, NSF, NASA, NIH, NOAA, USGS, NIST, Intelligence and other agencies and the private sector.

I expect a torrent of follow-ups by scientists, engineers, mathematicians, economists, artists and many others. The deluge will make the "cold fusion" free-for-all look like a picnic.

- Who will prepare the journals, professional organizations, private sector, academia at every level, and the World?
- Who will determine what's bona fide and what's not?

Graphics, Physlet Physics, the Internet, and other modern tools are vital to quickly and correctly grasp the concepts involved. I cannot even begin to tell you how will modern physics and advanced physics and engineering be impacted. The questions are too many and the funds required immediately are great. President Obama has already provided valuable resources to the STEM and related effort, to education, and to other vital national needs, many of which will be impacted by the above Work. The President has also inspired many young and old citizens to

recover our leadership in science, technology and mathematics, to revitalize the economy, and to strengthen our national security by learning and teaching and training and schooling. I had marshaled considerable personal and family funds since the 1950s to complete the above Work. I can see millions of citizens begin to work immediately, on their own and with their funds, to advance my findings for their benefit and the benefit of the Nation. The NSF can play a unique, major and historic role here. I am ready to work with you within my present health and personal limitations.

Recommendation #101: Establish an Interdisciplinary Team to evaluate the Scope of the Work and advise the Director's Office on follow-up action.

I hope to see you again soon.

Best regards,

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