An open letter to Dr. Edmund Synakowski, the Associate Director of the DOE Office of Science for the Office of Fusion Energy Sciences (submitted on Sept. 14th, 2012)

This is a letter in response to the DOE Office of Fusion Energy Sciences (OFES) FY13 budget proposal; a letter from young research scientists and professors, those "under 40", who have committed themselves to careers in plasma & fusion science.

The US Administration has made "a world-class commitment to science", with the goal to attract more US students into science and engineering now, and to the international tokamak fusion project, ITER, scheduled to reach full operating capacity 15 years from now. These commitments should be applauded; and they should be acted upon in a sensible manner – maximizing the return on investment for the US taxpayer in today's tough fiscal environment.

With the price tag upwards of $20 billion, ITER is the cornerstone of the world's fusion energy program. It represents a leap forward on the path to a viable fusion reactor. Yet, ITER is more than an engineering project. ITER will have to access, confine and control a self-sustained, burning plasma. The challenge of studying this plasma state is matched by the anticipation of what we will learn. There are theories of how a burning plasma will behave, and for how associated heat loads and energetic particles will impact the ITER wall materials. But one thing we know for sure: this is discovery science and a burning plasma will produce plenty of surprises when we get there. Some surprises may be advantageous, others we will have to mitigate.

The US plasma & fusion program must be in a position to understand and expand upon these new physics insights. The vibrant *domestic program* must be maintained and nurtured, so that today's graduate students and postdocs can become experienced scientists and leaders 15 years from now. Instead, the Administration's FY13 OFES budget redirects 1/6th of the FY12 domestic spending to the ITER project. If this trend continues, within the next two years hundreds of scientists and engineers at some of the premier US institutions will be laid off. In the long run, this will lead to *the permanent loss of some of the brightest young minds* from the US plasma & fusion program, and likely from the academic and research community altogether.

The fusion program has a public image problem: It was supposed to deliver cheap and safe nuclear energy long before many of us entered the field. But the US plasma & fusion program is much broader than energy research. We study supernovae explosions, solar coronal mass ejections, galaxy clusters, wake-field accelerators, the basic complexity of dynamical systems, and many other natural and man-made plasma phenomena. The enormous breadth of plasma science draws on many funding agencies, but the National Research Council 2010 Plasma Science Report has called on the DOE Office of Science to take the "stewardship role" in guiding this multi-faceted and exciting research field forward. The Office of Science must act on this deed of trust, enabling us to capitalize on the public curiosity and interest in the 99.9% of the visible Universe we call a plasma.

The US Congress has consistently said that "ITER funding is not to come from the already underfunded domestic research effort", yet the contributions to ITER are threatening to consume *the entirety of the domestic OFES-funded program*. The proposed FY13 US contribution to ITER is $150M, on a schedule to double or even triple in the next few years. This makes us deeply concerned for the ability of the Office of Science to allow and encourage the domestic plasma & fusion research to survive and thrive.

The “under 40” crowd, those expected to lead our field in the ITER era, respectfully request:

Do not let the world-leading US plasma & fusion science program weaken in comparison to our partners and competitors. Instead, let us capitalize on the taxpayers' domestic R&D and ITER investments. Let us build a stronger and broader program to advance knowledge in basic plasma & fusion science and to prepare the US scientific workforce for the burning plasma era.

Signed by:

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In addition to the 63 early career "under 40" plasma & fusion scientists who signed this letter by the time the December 2012 issue of Physics Today went into print, the concerns and hopes expressed herein are shared by a broad spectrum of scientists regardless of their age and professional status. If you want your name to be added to the below list of those in support of this letter, please email Vyacheslav (Slava) Lukin at *vlukin1@mailaps.org* .

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