By Zia Mian, Stewart Prager, and Frank N. von Hippel

Once More Into the Breach: Physicists Mobilize Again to Counter the Nuclear Threat

Albert Einstein, center, and other members of the Emergency Committee of Atomic Scientists meet in Princeton, N.J., on Nov. 18, 1946 where they issued an appeal for $1 million to finance a nation-wide educational campaign on the social implications of atomic energy. (Photo via Oregon State University Library)

In Princeton 75 years ago, Albert Einstein announced the formation of the Emergency Committee of Atomic Scientists to educate and mobilize other scientists and the public on the dangers to humanity of the nuclear weapons recently developed by the United States and used to destroy two Japanese cities. The committee of distinguished scientists, almost all of whom had been part of the nuclear weapons program, declared, "We scientists recognize our inescapable responsibility to carry to our fellow citizens an understanding of the simple facts of atomic energy and its implications for society. In this lies our only security and our only hope. We believe that an informed citizenry will act for life and not for death."[1]

The scientists feared for the future. Faced with the nuclear threat, the committee proclaimed, "there is no possibility of control except through the aroused understanding and insistence of

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the peoples of the world." They began fundraising, with a goal of $1 million (about $10 million in today's dollars), and published leaflets, gave lectures and talks in person and on the radio, and supported some of the first documentary films on nuclear weapons issues. The group disbanded in 1951, and Einstein died in April 1955. One legacy is that physicists have inherited a special credibility and responsibility for nuclear issues, perhaps more than we deserve.

Today, we see growing political, financial, institutional, and technical commitments to a new generation of nuclear weapons. If realized, nuclear weapons at current levels will become entrenched as part of national and international politics for the rest of this century. To contend against this future, last year we joined other colleagues in establishing the Physicists Coalition for Nuclear Threat Reduction, with the goal of educating and organizing physicists for nuclear arms control advocacy by engaging Congress and the public on the continuing danger posed by nuclear weapons.

Early Efforts

Scientists, including Einstein, had been active on nuclear policy even before World War II.[2] In August 1939, Einstein famously signed a letter to President Franklin Roosevelt warning "that it may become possible to set up a nuclear chain reaction in a large mass of uranium… and it is conceivable…that extremely powerful bombs of a new type may… be constructed."[3] During the war, Danish physicist Niels Bohr, who had presided over the shaping of our modern understanding of the atom, managed to meet with Roosevelt and UK Prime Minister Winston Churchill, urging them to talk to the Soviet Union, a wartime ally, about the secret bomb program in the hope of preempting a postwar nuclear arms race. For his troubles, Bohr raised Churchill's ire, with Churchill suggesting, "It seems to me Bohr ought to be confined or at any rate made to see that he is very near the edge of mortal crimes."[4]

In the spring of 1945, led by James Franck, a group of scientists at the University of Chicago working on the atomic bomb program, made the same argument in the "Franck Report" and urged that the United States not use nuclear weapons on Japan or at least not do so without first consulting with its allies, including the Soviet Union. The report begins,

> The scientists on this project do not presume to speak authoritatively on problems of national and international policy. However, we found ourselves, by the force of events, the last five years in the position of a small group of citizens cognizant of a grave danger for the safety of this country as well as for the future of all the other nations, of which the rest of mankind is unaware. We therefore felt it our duty to urge that the political problems, arising from the mastering of atomic power, be recognized in all their gravity, and that appropriate steps be taken for their study and the preparation of necessary decisions.[5]

The physicists' wartime efforts to impact U.S. nuclear policy were cloaked by secrecy, and all failed. After Hiroshima, however, the secret was out, and some scientists from the Manhattan Project that had built the atomic bomb rushed to inform the public of the terrible new weapons they had helped create and of their ideas for international control. It was an uphill battle. Polling in the days after the atomic bombing of Hiroshima found that more than 80 percent of Americans approved of dropping an atomic bomb on Japan and almost as many welcomed the development of the bomb.[6]

Public education by the scientists, the pioneering journalism by John Hersey about Hiroshima, and the work of countless activist groups did get traction. When the public was listening, activist scientists began to have some successes in Congress.

In the late 1950s and early 1960s, thousands of scientists, led by Linus Pauling, winner of the Nobel Prize in chemistry, provided technical support to the public's desire to end atmospheric nuclear testing and its associated global radioactive fallout.[7] This effort helped enable the 1963 Limited Test Ban Treaty, which banned nuclear testing everywhere but underground, and Pauling was awarded the Nobel Peace Prize that same year.

A decade later, with the public aroused by the Army's proposal to put nuclear-armed interceptors for Soviet ballistic missiles in the suburbs, Congress listened to the arguments of scientist critics that the defenses being proposed could easily be blinded and overwhelmed by the Soviets. That led to the 1972 Soviet-U.S. treaty limiting anti-ballistic missile defenses and the offense-defense arms race that had already been triggered.[8]

In the 1980s, scientists led the resistance to President Ronald Reagan's Strategic Defense Initiative program, commonly known as "Star Wars," with thousands of scientists and engineers signing a pledge not to seek or accept funding to work on this space-based weapons program.[9]

Scientists actively supported the nuclear freeze movement in the 1980s. This included Carl Sagan and others who alerted the world to the risk of possible global atmospheric and climate consequences of large-scale nuclear war, including a years-long "nuclear winter" created by sunlight-blocking soot in the stratosphere from burned cities.[10]

In the mid-1980s, U.S. and Soviet scientists joined together to demonstrate in-country monitoring of Soviet General Secretary Mikhail Gorbachev's unilateral nuclear test moratorium, reviving U.S.

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congressional interest in and pressure for a Comprehensive Test Ban Treaty, which was finally realized in 1996.[11]

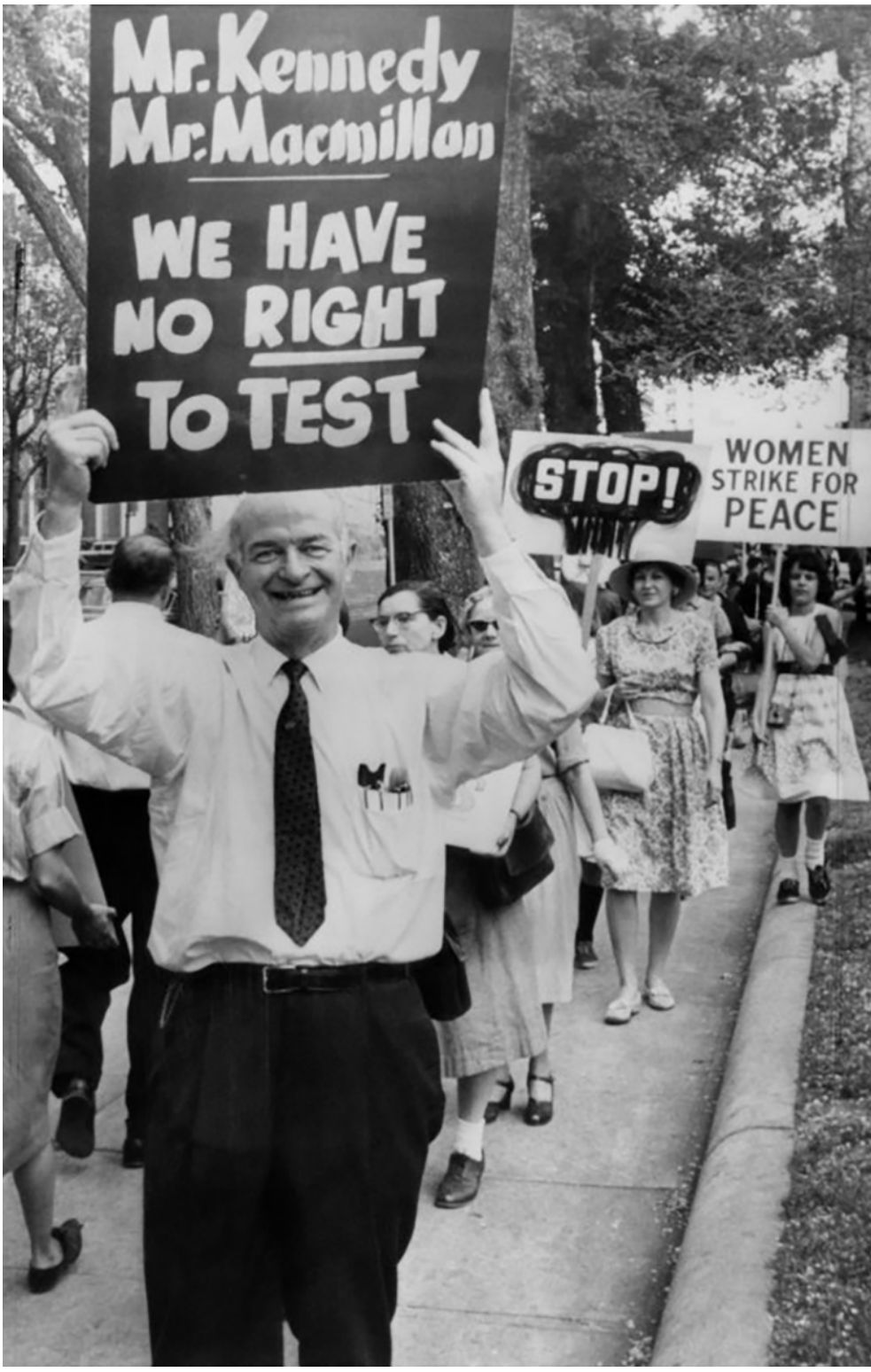
With the end of the Cold War, however, many activist scientists set the nuclear weapons issue aside as public concern about the danger from the weapons waned. The focus shifted from U.S. nuclear weapons postures, policies, and budgets to the security of nuclear weapons and materials in the former Soviet Union and the dangers of nuclear proliferation. Although a few stalwarts of nuclear arms control continued to press for progress, members of Congress who had been engaged and educated by activists and scientists in the nuclear freeze movement were succeeded by members with other concerns. Nuclear weapons policy became primarily the province of entrenched interests: members representing states and districts with nuclear bases, nuclear weapons laboratories and military-industrial corporations, and nuclear strategists and lobbyists.

The Nuclear Challenge Renewed

When the Cold War ended 30 years ago, there was hope among many that nuclear weapons soon might be abolished. That passed, however, and more recent prospects for progress and leadership on disarmament by the United States raised by President Barack Obama in his speeches in Prague and Hiroshima have dimmed. Reductions of the Russian and U.S. arsenals have stalled, and in most of the seven other nuclear-armed countries, stockpiles of operational nuclear weapons are increasing.

Today, the world has about 10,000 operational and reserve nuclear warheads, plus several thousand weapons set aside for dismantlement. On average, they are about 10 times more powerful than the bombs that destroyed Hiroshima and Nagasaki; almost 2,000 of those weapons are on alert, ready to be launched on short notice.[12] U.S. policy continues to maintain the option of first use of nuclear weapons in a conflict. Over the next several decades, nuclear weapons spending by the United States alone is expected to exceed $1.5 trillion.[13]

Why should today's physicists have a special responsibility to deliver the message of the urgent need to challenge the continuing dangers from nuclear weapons? We did not invent the atomic bomb, and outside the three large multibillion-dollar-per-year U.S. nuclear weapons laboratories, few U.S. physicists have much to do with nuclear weapons. At its most fundamental level, the catastrophic potential of thousands of nuclear warheads can be understood by anyone. Contending with these dangers



Linus Pauling outside the White House, Washington DC, protesting against nuclear weapons testing, April 28, 1962. (Photo courtesy of National Archives and Records Administration, courtesy AIP Emilio Segre Visual Archives.)

involves a mixture of technical, policy, geopolitical, and ethical considerations that is not taught in physics or any other discipline but must be learned on the job by activists and government officials alike.

Through our knowledge of physics and reading and discussion, some physicists have become more expert in some aspects of nuclear weapons issues than most of our fellow citizens, but many of them understand the human and ethical aspects as well or better than we do. Whether justified or not, the voice of physicists on this problem seems to carry special weight. We have learned this as members of our local peace group, where we are invited along as their "experts" when they have constituent meetings on nuclear weapons policy with members of Congress or their staffers.

All physicists are aware in principle of the tremendous explosive potential of nuclear processes. Yet, like the general public after the Cold War, most do not view nuclear weapons as a high-priority issue. This seems especially true of younger physicists who did not experience the recklessness, near misses, and political struggles of the Cold War. We believe there is a latent interest in the topic, however, because of the history of leading physicists' engagement as citizen-scientists during the second half of the 20th century.

The Physicists Coalition began work in September 2020. It is sponsored by the American Physical Society (APS), a national scientific society with 55,000 physicists as members, and is partly supported by an APS Innovation Fund award. The coalition is currently partnering with the APS Office of Government Affairs, which coordinates APS-backed advocacy campaigns. Princeton University's Program on Science and Global Security hosts the coalition. Our goal is to develop a new national network of citizen-physicists as a strong voice for nuclear threat reduction.

During our first year, the coalition has been built through a grassroots process of outreach to the physics community. The coalition has a team of 12 arms control experts who have given virtual colloquiums on the dangers of nuclear weapons at 60 university physics departments and one Department of Energy national science laboratory. The universities mostly are in districts and states whose U.S. representatives or senators serve on their respective armed services committees and so have responsibility for nuclear weapons budget issues. We hope to expand to other relevant committees and to all 50 states.

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The presentations vary, but all provide an overview of the danger posed by nuclear arsenals around the globe, on the threatened state of the nuclear arms control and nonproliferation regimes, and on possible immediate steps to reduce the threat. The colloquiums are followed by a meeting offering more in-depth discussion for those interested in learning about or joining the coalition.

Thus far, there has been little to no pushback to our core message that the nuclear status quo poses an existential, unacceptable danger. In fact, the colloquiums often lead to extended discussions on policy and technical aspects with strong expressions of support for threat reduction measures. Our site visits, plus a few webinars to which the larger membership of the APS Forum on Physics and Society has been invited, have resulted in a current coalition membership of more than 400 spread across the United States. Although initially focused on recruiting physicists, the coalition welcomes all interested physical scientists, including those in engineering science.

The coalition is making a special effort to recruit and support physicists who are women, people of color, or otherwise underrepresented in nuclear weapons policy debates. To this end, we have initiated a one-year Next-Generation Fellowship targeting early-career scientists and underrepresented groups. The first four fellows are working with more senior mentors to learn nuclear policy through practice and to train in policy communication and advocacy.

Those who join the coalition do so to learn more about nuclear weapons issues and to be active advocates. In the fall of 2020, as one small part of a larger mobilization by nongovernmental organizations (NGOs), coalition members advocated for congressional support of the extension of the New Strategic Arms Reduction Treaty and for striking $10 million in funding in the Senate version of the National Defense Authorization Act designated for preparations for renewed U.S. nuclear weapons testing. The membership (about 250 at the time) generated about 400 separate contacts with Congress via emails, phone calls, and virtual meetings with staff. Both legislative goals were achieved.

Currently, the coalition is preparing to argue for the United States to adopt a more restrictive nuclear policy, either no first use of nuclear weapons or that the sole purpose of nuclear weapons is to deter their use by other countries. There is renewed hope this effort can be successful given the past support expressed by President Joe Biden for such a declaration by the United States. Other near-term advocacy goals are under discussion. Coalition members have also been developing expert policy papers on adopting a no-first-use policy, ending the U.S. policy of having a launch-on-warning option, and retiring rather than replacing U.S. intercontinental ballistic missiles.[14]

Ultimately, the elimination of the nuclear threat will require much more than a coalition of physicists and will involve more fundamental policy shifts. We are reaching out to see whether other scientific communities in the United States are interested in making common cause. As Einstein and the Emergency Committee understood, succeeding at nuclear threat reduction will require an

informed public consistently engaged with nuclear weapons policy. We therefore are beginning to collaborate with citizen groups and NGOs working on the shared goal of educating the public and Congress on steps toward removing the nuclear shadow over our future.

Public support for this goal, albeit mostly passive, already exists. A 2020 survey found that two-thirds of Americans, including majorities of Democrats, independents, and Republicans, agreed that no country should be allowed to have nuclear weapons.[15] As a result of advocacy by the Back From the Brink campaign and the International Campaign to Abolish Nuclear Weapons, 53 U.S. cities and towns and four state legislatures (California, Maine, New Jersey, and Oregon), many organizations, and some civil leaders, including in Congress, have expressed support for specific steps to reduce nuclear threats and for nuclear disarmament.[16]

Finally, because the nuclear problem is global, its solution requires an international effort. The coalition is beginning to explore with communities of physicists in other countries their interest in educating their own governments. There is already interest from members of the Pugwash Conferences on Science and World Affairs, a movement that emerged from the Bertrand Russell-Albert Einstein Manifesto of 1955 and received the Nobel Peace Prize in 1995.[17]

The engagement of activist-physicists with their national nuclear politics is especially important now in the nine countries that have nuclear weapons, the five countries (Belgium, Germany, Italy, the Netherlands, and Turkey) that host U.S. nuclear weapons, and the more than 25 additional countries that the United States has promised to use its nuclear weapons to defend if they come under attack. In some of these countries, the new UN Treaty on the Prohibition of Nuclear Weapons, which bans the use and the threat of use of such weapons, has already gained broad public support.[18] The treaty entered into force in January 2021 and has 86 state signatories so far. There may be new allies here for the scientists of today who carry on with the crucial task set out by Einstein's Emergency Committee so many years ago.

ENDNOTES

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