

Q&A: Ernest Moniz on the nuclear weapons threat

Nuclear and nonnuclear nations need to act to prevent the growing risk of accidental or deliberate use, says the former US secretary of energy.

As Hollywood was preparing for the Academy Awards in early March, a publicity campaign that had nothing to do with advocating for a best actor or best cinematography nominee became increasingly visible in Los Angeles. Posters plastered across the city warned that although “[J. Robert] Oppenheimer is history, nuclear weapons are not.”

The campaign advocating for the end of nuclear weapons was the creation of the nonprofit Nuclear Threat Initiative (NTI). Founded in 2001, the nonprofit global security organization focuses on reducing nuclear and biological threats and has increasingly become a voice for nuclear disarmament. Ernest Moniz, a former MIT physics professor and secretary of energy for President Barack Obama from 2013 to 2017, is the organization’s CEO.

Moniz spoke with *PHYSICS TODAY* a few weeks after the Oscars to discuss the NTI’s nuclear security efforts and the challenges of elucidating the nuclear threat to the public.

PT: How significant is the threat of nuclear weapons use today?

MONIZ: When the Cold War ended, almost everyone exhaled and thought the age of nuclear weapons was over. The reality is that in the 30 years since then, we have now come back to a place where the risk of nuclear use, either accidentally or deliberately, is probably at least on the scale of the Cuban missile crisis. Vladimir Putin’s implicit and explicit threats on nuclear weapons use around Ukraine have violated all kinds of norms, including Russian norms: The P5 [the five permanent members of the United Nations Security Council, all declared nuclear weapons states, which include Russia] all agree that we would not use a nuclear weapon, or threaten the use of a nuclear weapon, against a non-nuclear-weapons state.

Now we have China building its arsenal: US intelligence predicts on the order of 1500 weapons in China by 2035 [roughly the same number of deployed warheads that the 2011 New START Treaty imposes as a limit for the US and Russia]. Then there is North Korea and its nuclear saber-rattling. And you have the whole world of emerging technology cybersecurity and AI.

The history of US–Soviet and US–Russia relations has always been built around a bilateral control architecture. Let’s say that China comes in at a similar scale to the US and Russia 10 years from now. In simple-minded physics terms, two-body negotiations don’t fit. You can’t do the fundamental algorithm of US and Russia having equal numbers if there’s three. The hawks will say we have to have as many deployed weapons as the sum of Russia and China. That’s great, except Russia and China would never accept that. That is a formula for an arms race. We don’t need 1550 deployed weapons, let alone another couple thousand, to deter Russia and China at the same time.

As you know in physics, the two-body problem is inherently stable, and the three-body problem is inherently not. We need a whole new algorithm for strategic stability in a multipolar world. The non-nuclear-weapons states have to be in this conversation. They also signed the Nuclear Non-Proliferation Treaty, and there is a lot of unhappiness with the weapons states for not making adequate progress toward the agreed-to goal [of world disarmament].

PT: Can you discuss the NTI’s involvement with the fail-safe review underway at the Department of Defense?

MONIZ: Fail-safe means that if there is a failure of command-and-control systems, it does not lead to catastrophe. We’ve had several incidents of incorrect information reaching the presidents of the US and



Russia that there were incoming strikes. [See “Nuclear weapons dangers and policy options,” by Steve Fetter, Richard Garwin, and Frank von Hippel, *PHYSICS TODAY*, April 2018, page 32.] The last and only systematic fail-safe review done in the US—and we don’t know of any that have been done elsewhere—was during the George H. W. Bush administration. Today’s geopolitical and technological world bears no resemblance to the world of 1990. In this world of cyberattacks and new technologies such as AI, everything should be on the table for evaluation.

[NTI cofounder and US former senator] Sam Nunn and I went directly to the House and Senate Armed Services Committees, and the chairs of the two committees mandated a fail-safe review in the 2022 National Defense Authorization Act. That review is now being carried out, and the expectation is that it will be finished this fall.

If all the countries with nuclear arsenals would do their own fail-safe reviews, it would lower the risk of accidentally blundering into the use of nuclear weapons. It’s in their self-interest, as well as in the interests of everybody else.

PT: Is accidental use still your biggest concern?

MONIZ: Twenty years ago we would have said the primary risk was accidental use. A second risk, especially since 9/11,



A BILLBOARD parked in front of the Hollywood Walk of Fame in the days before *Oppenheimer* received seven Academy Awards. The sign was part of a blitz campaign by the Nuclear Threat Initiative in support of global nuclear disarmament.

is terrorists getting hold of a weapon or weapons materials. But the deliberate use of weapons by nuclear weapons states was until recently thought to be a sort of thing of the past. NTI is partway through a major project looking *de novo* at the risk today of deliberate use and how to construct norms, and ideally agreements, to lower or eliminate those risks.

PT: What was the inspiration for the Academy Awards publicity campaign calling for an end to nuclear weapons?

MONIZ: Recognizing that we have limited capacity, we've always had an eye on how and when we can help influence public opinion, particularly in a way that would ultimately create more political imperatives in the policy world to work toward that vision. We had been told directly by members of Congress who were quite involved in nuclear security policy that there's only so much they could do because their constituents are not exactly writing letters saying they are worried about nuclear threats.

Oppenheimer, its popularity, and its 13 Academy Award nominations provided an unusual opportunity to engage in a strategic communications initiative. About five weeks before the awards, we got a significant anonymous gift to do just that.

We had a five-week blitz that included an op-ed by me and [former California governor] Jerry Brown and an open letter with signatories from the entertainment industry. We put up a thousand posters in L.A., particularly on the route to the awards ceremony, and we commissioned a pop artist to do some outdoor art where there is a huge amount of foot traffic. Cillian Murphy made a brief statement in his acceptance speech for best actor. And [director] Christopher Nolan made some strong statements in interviews about listening to *Oppenheimer's* warnings in the postwar period.

Oppenheimer's postwar warnings were about not getting into an arms race and not developing evermore powerful nuclear weapons. Today it's pretty routine to have weapons with one or two orders of magnitude more yield than those in World War II.

PT: You talk a lot about educating the public. But nuclear weapons have been around nearly 80 years, and everyone surely is aware of the threat they pose.

MONIZ: I don't agree with that premise. Much of the population was born since the end of the Cold War. They kind of know, but they don't view it as a major threat until maybe very recently, driven

mainly by Putin's statements. North Korea is far away. "It doesn't threaten us directly," is the public's attitude. "India and Pakistan, well you know they're always fighting." That kind of thing.

PT: But couldn't increasing public awareness of the nuclear danger reinforce support for arms buildup?

MONIZ: That's where we have to guide education in our way, that [more weapons] will just increase the risk. At NTI, we are also looking at updating the potential effects of a nuclear war. There's the blast, radiation, and nuclear winter. I'm not saying it isn't bad enough already, but we saw painfully how COVID-19 completely discombobulated global supply chains. Imagine what would happen in a nuclear war. The scale of the effects in the modern world are probably much worse than was anticipated 30 years ago.

We've been doing some work, but it's very much on our punch list for trying to attract the resources to make a big effort here. It's all consistent with our thinking that if the public understands in the modern context the extreme implications of nukes-use exchange, that can be part of building up the pressure on the will to address these risks in a serious way.

David Kramer