

Nuclear transitions

US nuclear diplomacy appears to be entering a turbulent phase. Although their voice is currently sidelined by geopolitical events, physicists have a duty to speak up.

At the 2016 March meeting in Baltimore, the American Physical Society organized a session that caught the attention of many participants. The topic under discussion was ‘The Iran Nuclear Deal: Physics, Physicists and the Historic Agreement’, or more precisely, the Joint Comprehensive Plan of Action (JCPOA) under which Iran agreed to scale back its nuclear programme and allow inspections of its nuclear facilities in exchange for the limited removal of economic sanctions imposed by the United States, the European Union, Russia and China. The talks covered aspects such as the technical makings of the JCPOA, as well as the role played by physicists in preparing the ground for the agreement itself, and the opportunities for establishing scientific collaborations with Iranian scientists. A sense of optimism was tangible, as was, perhaps, a tinge of pride in the role that physics had played at the highest levels of international diplomacy.

How quickly times change. The decision announced on 8 May by US President Donald Trump to pull his country out of the agreement calls its very survival into question. A first consequence of Trump’s move has been to cause a split between the US and its western European allies that still back the agreement. For now, Iran has also signalled its intention to stick to its commitments. However, European companies that opted to invest in Iran in the past few years are now staring US sanctions in the face, so they are likely to pull out of the country — even if the EU imposes a so-called blocking statute that forbids them from complying. The economic incentive for keeping the deal alive is thus undermined, and Iran may conclude it is free from its nuclear constraints.

Nuclear physicists played a vital role in making the deal possible in the first place. Their technical knowledge helped to determine Iran’s nuclear capability and, by judging a number of technological factors, the amount of time it would have taken the country to make enough material for a nuclear weapon in the absence of a deal (its so called breakout time). Moreover, they also helped to establish the protocol required to allow uranium enrichment for (peaceful) nuclear fuel, but with sufficient constraints to make any weapons proliferation detectable.



Credit: Niels Bojesen

This latter aspect formed a cornerstone of the agreement, but from the outset it was understood that the JCPOA had a limited lifespan: in effect, it bought a time window of about ten years to devise wider plans to limit nuclear proliferation in the Middle East and to create the conditions to bring Iran back into the international fold following decades of isolation. Official inspectors have declared Tehran to be in compliance with the accord, so we must conclude it is geopolitical factors that have compelled the US administration to pull the plug.

Whatever one may think of the US assessment of its interests in the Middle East, the Iran decision is the latest example of a unilateralism that typifies the Trump presidency. Alienating key allies is unlikely to be cost-free in the long run, no matter how politically weak they may appear to be now. It is certainly possible that by pulling out of this ‘bad deal’ the US can negotiate a better one. But the chances are that we will either end up with a nuclear Iran, or be witness to military action to damage their nuclear capability. Neither outcome is worth the risk.

Another nuclear crisis at a critical juncture concerns North Korea. Here, recent developments appear to be more positive: following months of nuclear tests and bellicose rhetoric, a historic inter-Korean summit took place on 27 April focusing on the North Korean nuclear weapons programme and the denuclearization of the Korean peninsula. Indeed, a few days after pulling out of the JCPOA with Iran, Donald Trump announced that in June he would meet with North Korean leader Kim

Jong-un in Singapore. As *Nature Physics* goes to press, however, it appears that this will not go ahead. Nevertheless, even if these recent developments lead only to partial denuclearization and the beginning of the process to prise open North Korea through Chinese and South Korean investment, critics will have to accept them as a significant success.

Ultimately, US foreign policy must be judged by its results. Its contrasting approaches towards North Korea and Iran can mostly be explained by their different geopolitical characteristics — not least the fact that one country has a nuclear bomb and the other one does not. Having said this, the degree to which nuclear physicists and engineers have been sidelined even within the internal debate in the US administration is concerning: the Office of Science and Technology Policy, the government department with the mandate to advise the president on the effects of science and technology on domestic and international affairs, currently has no head and its most senior official is Michael Kratsios, a 31 year old with a political science degree.

What seems clear is that there are big changes afoot and, given the nuclear dimension, the stakes are very high indeed. One does not need to be a seasoned game theorist to understand that the current unilateralist policy carries a significant risk of miscalculation — especially if it is subject to presidential whims. □

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