Iran Nuclear Deal Opens Door to Scientific Collaborations

By: Richard Stone

After 2 years of negotiations, Iran agreed to dismantle large pieces of its nuclear program in exchange for lifting crippling economic sanctions. The agreement, signed today in Vienna, paves the way for a rapid expansion of scientific cooperation with Iran in areas as diverse as fusion, astrophysics, and cancer therapy using radioisotopes.

The agreement between Iran and six world powers is expected to face significant hostility in the U.S. Congress, which has 60 days to review the deal—and endorse or scuttle it. “I welcome a robust debate in Congress on this issue, and I welcome scrutiny of the details of this agreement,” U.S. President Barack Obama said today. However, he noted, “Without this deal, there would be no agreed-upon limitations for the Iranian nuclear program.”

The agreement, known as the Joint Comprehensive Plan of Action, would slow Iran’s “breakout time”—the time needed to produce enough weapons-grade fissile material for one bomb—from an estimated 2 to 3 months to at least a year. Achieving that longer lead time requires blocking Iran’s four routes to nuclear weapons: through its Natanz and Fordow uranium enrichment facilities, where thousands of centrifuges separate uranium isotopes; through plutonium production at the Arak heavy water reactor, which Iran says is needed to produce medical radioisotopes; and by way of a covert path involving undisclosed facilities. The challenge has been to block these pathways without shuttering a single nuclear facility, because Iran has insisted that closures were a deal-breaker.

The plan requires Iran to mothball thousands of uranium centrifuges at Natanz and Fordow, and not to pursue other methods of uranium enrichment, including laser enrichment, for the next 10 years. Iran has agreed to work with the international community to reconfigure Arak to run on low enriched uranium, which would greatly curtail plutonium production, and ship all spent fuel out of the country for the reactor’s lifetime. Eliminating the covert pathway will rely on intrusive inspections and unprecedented oversight of Iran’s purchases for its nuclear program.

Key research elements of the plan jibe with those outlined in a tentative accord struck in April. For example, Iran will convert its sensitive Fordow uranium enrichment facility into an international “nuclear, physics, and technology centre,” allowing it to remain open as a research lab. “It’s a clever strategy—a creative solution to a dilemma,” says Steven Miller, director of the international security program at Harvard University’s Belfer Center for Science and International Affairs.

Russia will help Iran reconfigure two centrifuge cascades at Fordow to produce stable isotopes for industry. The new lab will also host small linear accelerators for basic research in nuclear physics and astrophysics. The agreement says that Iran will invite proposals for collaborative projects and calls on Fordow to host an international workshop to review them, with a goal of initiating projects “within a few years.”

The agreement also calls for exploring cooperation in other research areas, such as neutrino astronomy and fusion research, and even “facilitating” Iran’s
Iranian and U.S. nuclear scientists have much to learn from each other, says Robert Rosner, a theoretical physicist at the University of Chicago in Illinois and former director of Argonne National Laboratory. “It’s an incredibly long time since we’ve built any nuclear reactors,” he says. “Iran has world-caliber scientists and engineers, and they have been in the thick of doing that. I can imagine which way information may flow.”

Iran’s nuclear scientists may be skittish at first about engaging, Miller says, citing the assassination of several key nuclear scientists after Iran’s once-clandestine nuclear program emerged from the shadows a decade ago. “Iran naturally became hypersensitive about access to its scientists,” Miller says. But those dark days may soon be over. “When scientists get together,” Rosner predicts, “differences always fall away.”

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This content was published on July 20, 2015 as an HDIAC Spotlight at the following URL: https://www.hdiac.org/node/1820