

**Remarks for Melinda Pavek at Linear Collider Board Meeting
“US-Japan Cooperation in Science and Technology”
Sendai, Miyagi, Japan
November 1, 2019, 15-20 minutes**

- Thank you for inviting me to speak in front of some of the most distinguished particle physicists in the world today.
- There are three things I would like to begin with before I start my formal remarks.
 - This morning, after observing the summaries of your activities this week, I just want to say how grateful I am and how impressed I am with the combined brilliance and dedication of everyone involved in the effort to build the Linear Colliders.
 - Second, I would like to welcome you to Sendai, my Japanese hometown. I lived here for five years as an English teacher, and it is a very special place. I hope you have been able to get out and see some of the city during your visit.
 - Third, I will not be using Power Point today. Diplomats focus on words, rather than pictures. I hope that will be OK.
- The State Department has a long history of working with fundamental physicists to advance the field for civil purposes, promoting economic growth, and strengthening the alliances between countries.
- Our principle concern has been, and continues to be, the ability to ensure that the brightest minds in the world have opportunities to advance their field for the benefit of all humanity.
- As many of you know, in June 1950, Dr. Isador Rabi, one of the founders of Brookhaven National Laboratory in the United States,

recognized the need for a European center of excellence in the physical sciences.

- Europe was undergoing severe brain drain to both the United States and the Soviet Union, and there was a clear advantage for the United States in seeing Europe further develop its own technical prowess.
- Rabi's involvement led to the tabling of a resolution to create such a center of excellence with the backing of the United States and UNESCO, which would lead to many decades of collaboration between laboratories.
- Today, the State Department continues to support our particle physics community, primarily in Washington, through the Bureau of Oceans and International Environmental and Scientific Affairs, and through our Environment, Science, Technology, and Health sections in Embassies around the world. I am the Director of that section of our Embassy in Tokyo. We call ourselves the Science, Innovation and Development Unit to fully describe all that we support in a slightly catchier name. We collaborate closely with our DOE Attaché colleagues, our NASA Attaché and other U.S. agency representatives.
- At the State Department we see ourselves in a supporting role; our central objective is to ensure that these scientific facilities continue to play their historic role as engines for talent generation, innovation, and international collaboration.
- Our involvement in these activities has increased, particularly over the past few years, as the U.S. government has charted its overarching strategy for particle physics through the Particle Physics Project Prioritization Panel (P5). JoAnne did an excellent job of explaining that process. As she said, at the heart of the P5

strategy is the statement that “particle physics is a global field” where the United States and major players in other geographic regions together address the full breadth of the field’s most urgent scientific questions.

- As research consortia grow larger, so too grow the demands for resources, be they human, financial, or material.
- State has chosen to work closely with the Department of Energy and the National Science Foundation to ensure that future projects in particle physics have the appropriate resources and governance models essential to the success of these mega projects.
- We have seen our engagement benefit not only large-scale international collaborations, like our involvement in the Large Hadron Collider at CERN, but also in facilities hosted domestically in the United States, like the Long Baseline Neutrino Facility (LBNF), its associated Deep Underground Neutrino Experiment (DUNE), and the Proton Improvement Plan-II accelerator project (PIP-II).
- We recognize that international interest, participation, and collaboration are key validators for domestic agencies and appropriators who are concerned primarily about a project’s financial viability.
- Establishing a baseline of international interest and demonstrating the seriousness of that interest is, therefore, a key criterion for the success of major projects.
- That means that we often need to do our homework with our partner agencies before a major facility gets the green light in the United States, to network with the scientific community and be

ready to help our partner agencies as quickly as possible.

- Our experience in navigating mega science facilities—be they the International Space Station or the Large Hadron Collider—means that we have a good sense of what works and what does not, and our negotiators are primed to look out for potential future red lines.
- Once the United States has committed to a facility, we intend to make best efforts to keep that commitment. This is not always easy.
- We recognize that governments and leadership change regularly in democracies. What one administration might support, another might oppose.
- Therefore, it is critical for State Department diplomats to be aware of the nature of democracy and to ensure that members of all political parties agree on the importance of these significant investments.
- Moreover, when it comes time to sign an agreement, we intend to make sure that agreement represents the ability of the United States to put its best foot forward for the sake of science and international relations.
- Today, I come before this distinguished body to tell you that the U.S. Department of State has done our initial due diligence, and we are ready to assist our partner agencies in moving forward with the next major particle physics facility in Japan—the International Linear Collider, also known as the ILC.
- To be clear, the United States is not looking for an immediate decision on building, or hosting, the ILC. Instead, the United

States is looking for Japan to signal an intent to explore hosting the ILC.

- We are ready to do so because of the depth of trust, partnership and collaboration that exists between the United States and Japan. As you are all aware, Japan has been a close ally of the United States for decades, and our economic, scientific, and cultural relationship has deepened through that time. Our science and technology collaboration is a critically important aspect of our relationship.
- Please allow me to share some examples of our joint R&D collaboration.
- Let's think back to 2012, when the announcement of the Higgs particle rocked the world. That discovery was made by scientists supported by the U.S. Department of Energy (DOE) and Japan's Ministry of Education, Culture, Sports, Science and Technology (MEXT), in collaboration with researchers from around the world including those from Europe and CERN..
- The United States, Japan and other nations continue to collaborate in order to make breakthroughs in our study of the Higgs Boson, which, in turn, could give us a better understanding about dark matter and dark energy — a phenomena that comprises more than 95% of our universe but is still not fully understood.
- These collaborators continue to produce hundreds of scientific publications each year to advance our understanding of the universe. By performing such particle physics experiments, researchers are now able to derive better calculations of dark matter properties.
- The same can be true at the next Higgs Factory — or the International Linear Collider — that will bring our collective minds and talents together to tackle the most challenging questions

about the Higgs and use it to continue exploring and enabling new scientific discoveries.

- DOE also has a variety of other joint projects and research with science and technology stakeholders in Japan.
- In neutron science, Oak Ridge National Laboratory and scientists from institutions in Japan have produced significant new results on problems in superconductivity, multiferroics, magnetism, and materials which exhibit magnetic and electric order. This research could be used to develop new materials for use in computers. In addition to these projects, Japanese scientists and researchers from Oak Ridge National Lab have worked together extensively in neutron scattering experiments at the High Flux Isotope Reactor.
- Our collaboration with Japan on neutron science will be strengthened by the neutron science project arrangement signed in August that establishes a collaborative R&D program on high power spallation neutron science and technology.
- DOE also recently signed a project arrangement which promotes cooperation with Japan in quantum beam science and technology, including x-ray light sources, accelerators, and related technology.
- The United States and Japan have long-standing bilateral collaboration programs in fusion energy sciences, including magnetic confinement experiments, fusion technologies, fusion nuclear science and materials, and basic plasma science. In January 2019, DOE and MEXT signed a project arrangement to advance and enhance cooperation in high-energy-density plasma science, including high-powered lasers. In Japan, American researchers are engaged in research efforts on the Large Helical Device and several mid-sized devices.

- Back in October 2015, DOE and Japan's world-class laboratory, the High Energy Accelerator Research Organization, or KEK, signed a project arrangement agreement to advance accelerator and detector technology development in order to support basic high energy physics experiments and offer opportunities to use these accelerators in other basic research disciplines and applied areas such as medical and material science.
- DOE's Advanced Scientific Computing Research (ASCR) program is working with Japanese counterparts on computer science and software related to current and future high-performance computing for open scientific research.
- Collaboration in nuclear physics includes research and detector development at the Relativistic Heavy Ion Collider, which is located at the Brookhaven National Laboratory. Japan has contributed more than \$100 million in instrumentation and support for scientific staff via the RIKEN-BNL Research Center. RIKEN-BNL is a joint venture in discovery science.
- U.S. and Japanese scientists work together in nuclear structure and astrophysics, primarily at the RIKEN accelerator facility.
- Our researchers also work together in Super Heavy Element Research and share a common goal in discovering new elements on the periodic table.
- Many of these collaborations were highlighted by DOE Under Secretary for Science Paul Dabbar during the U.S.-Japan Joint High-Level Committee Meeting on Science and Technology at the White House in May 2019. This meeting is held every two years, with a Joint Working Level Committee meeting generally in the alternate years.

As you can see, Japan has always been one of our most reliable partners in science through our successes and failures. And there are those who use a fear of failure or the memory of failure to stop forward progress. To them I highlight the words of famous Charles Kettering, an American inventor, engineer, and holder of 186 patents. He said “Ninety-nine percent of success is built on failure.”

- Success is also sweet. It opens a window to new knowledge and forces us to reassess our understanding of the universe. And from it, new rich technologies and capabilities emerge that advance society and economies around the world. To that point, I would like to cite American educator John Dewey who is quoted as saying “Every great advance in science has issued from a new audacity of imagination.”
- Japan, which has been risk averse at times in the past, has also opened up to the idea that growth comes from taking risks. We applaud Japan’s new Moonshot Research and Development Program. It has allocated almost \$1 billion to setting ambitious targets to solve difficult social agenda topics where the impact will be profound when success is achieved. In order to seek input from international thought leaders to help focus its efforts, Japan will be hosting a Moonshot International Symposium in Tokyo on December 17-18, 2019. The U.S. government is looking forward to having public and private sector scientific and social thought leaders in attendance to support the Moonshot’s efforts at a new audacity of imagination.
- We are grateful for the partner that Japan is, and that Japan shares with us a strong belief in the core principles of scientific inquiry: merit review, transparency, openness, reciprocity, and collaboration.

- In conclusion, allow me to bring my remarks back to the topic of linear colliders. As I noted earlier, today I come before this distinguished body to tell you that the U.S. Department of State is ready to assist our partner agencies in developing the next major particle physics facility in Japan—the International Linear Collider.
- We understand that developing the International Linear Collider would be a major undertaking for any country, and will require the contributions of many countries around the world.
- The 2014 U.S. P5 strategic plan, which JoAnne and I highlighted earlier, describes the strong scientific importance of the ILC.
- We also know that there are still significant decisions needed from all partner governments, including the United States and Japan, before we can reach what the Department of Energy calls a “Critical Decision Zero”—an approval of the project based on the mission need.
- On this note, let me highlight that project development and management to advance scientific collaborations are in the DNA of our partners at the Department of Energy. It is through such stewardship that the talent and expertise of our U.S. national laboratories and supported universities will be engaged to realize an International Linear Collider.
- We are ready to join hands with the particle physics community to explore how we may get to that point.
- Thank you for inviting me. I know you have had a productive meeting and deliberations this week here in Sendai. Let’s work together and launch the ILC project!