

Science for Peace and Development Today and Tomorrow*

Your Excellencies, Distinguished Guests, Ladies and Gentlemen.

It is an incredible honor for me to speak at the headquarters of the United Nations, which I admire as the guardian of world peace. The theme of this session is "Science for Peace and Development." I'd like to share my own thoughts on this theme.

Peace is about different nations working together toward a common goal, rather than fighting against each other. Development is to bring the state of humankind to a better and humanely acceptable condition from what it is today. How can science contribute to these two important objectives of the United Nations and thus all of humankind? Most people would say it's through technology, innovation and medicine. And I would clearly agree with that answer. But today I would like to offer an additional answer to this question.

Concerning peace, I'm fortunate enough not to have experienced a war personally - but not too distant. My father was born in Korea during Japanese occupation. And when the Japanese occupation ended, his family tried to flee Korea in a big chaos, and my father was nearly left behind. Very fortunately he was reunited with his parents at the last minute

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before boarding a boat. I wouldn't exist here today without this miracle.

I myself was born in Japan but grew up in West Germany, then a divided country. I once visited the divided Berlin. West Berlin was a thriving metropolis with fancy shops, streets busy with cars and pedestrians. After passing the checkpoint into East Berlin, I've seen a minefield and watch towers, followed by deserted ruins left over 30 years after World War II. This sight is etched vividly into my memory. The world has experienced wars, and is not an easy place.

In my scientific career mostly in Berkeley, California, I have worked with many colleagues and friends who had been caught in various conflicts or suffered persecutions. I worked with an Israeli who witnessed a suicide bombing a block away from his home; a Serb whose village was bombed by NATO; an Iranian who fled the Islamic revolution on foot to Turkey; a Russian who fled his country because of his Jewish origin; and a Ukrainian whose mother had to flee Crimea. I have worked with these people for a very simple reason: because we had a common goal, namely, to solve the mysteries of the universe.

I firmly believe that basic scientific research is a true peacemaker for humankind. I'm sure every one of you here today has this experience: you look up at the beautiful night sky, watch the stars, and suddenly your mind is filled with all these profound questions

about the universe. The awe of the beautiful universe makes differences in cultures, languages, colors, genders, religions, and ideologies simply disappear.

We live on a tiny piece of rock called the planet Earth that circles around an average star called the Sun, in a rural area 27,000 light years away from the center of the Milky Way galaxy, which is only one out of a hundred billion galaxies in the visible universe. If you see the big picture, our differences seem so small. This perspective makes me think differently about all the wars, conflicts, tragedies, poverty, and diseases we read in newspapers every day. There must be a way for us human species on this tiny piece of rock to work together.

CERN embodies this idea that basic science unifies people from all nations. I serve on its Scientific Policy Committee that reports to its governing body, the Council, even though neither of my countries, Japan nor the United States, are a member state of CERN. CERN only cares about my scientific expertise, not about where I am from or how much my countries pay. During my numerous stays at CERN, I've seen people from India and Pakistan, Israel and Iran, Russia and Ukraine working together. I was told that even at the height of the Cold War, CERN brought scientists from both sides of the iron curtain together. These days, thousands of people from friendly or warring nations come to CERN and build amazing scientific instruments. Some of them discovered the Higgs boson in 2012 - as has been mentioned already several times in this session - after nearly half a century of hunting. By the way, this Higgs boson is quite important to you; it fills the entire universe and it is keeping your body from evaporating in a nanosecond.

I recently listened to a talk by my colleague Eliezer Rabinovic from Jerusalem on a project in Jordan called SESAME. This is a project where people from



Bahrain, Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, the Palestinian Authority, and Turkey are working together to build a new particle accelerator as an intense light source for basic research in biology, material science, and medicine. Eliezer said, "In our region, the wars are not over. There are different perspectives on who won and who lost, who won yesterday and who wins tomorrow." Eliezer also said SESAME actually started in the CERN cafeteria, where the initial idea was hatched, like so many other science projects. Toward the building of an international laboratory for SESAME, the design based on the CERN model but tailored to the nations involved, required many negotiations and compromises. I was glad to learn that Berkeley as well as Japan provided the project with help to go over some big hurdles. He also emphasized the importance of generating public awareness about the project because "people don't believe Israeli, Arabs, Iranians, Pakistanis can work together... They are cynical about projects in Middle East." But now the light source is expected to be ready in late 2015 to prove that optimism wins and literally for people to "see the light."

So, CERN, I'm very impressed, has a history of uniting people in quests that have nothing to do with power but everything with knowledge.

I also believe that the quest for knowledge and the fascination with the mysteries of the universe

would be the key to development. This is because the fascination with stars and planets and outer space gets the children excited about learning more about science. If we nurture their curiosity properly, it leads to a more educated and scientifically minded population. To raise the standard of living requires scientific knowledge to all people. Everybody needs to understand that resources available on our planet are finite and not very much for billions of us. My friends in America need to accept that we are responsible for climate change and recent natural disasters. We need to convince still some skeptical people in West Africa that the threat of Ebola is real. My fellow Japanese should understand what the nuclear incidents in Fukushima really mean. And this development, based on curiosity for Mother Nature, can start with just looking up at the night sky, and sharing our awe of the beautiful universe.

Again, CERN embodies this type of science. I've read that this excitement with the discovery of the Higgs boson increased enrollment of high school students in science by twenty percent in Europe. CERN brings in thousands of students and high-school teachers every year. They witness people from all over the world working together peacefully to solve the most profound mysteries of the universe we live in. They bring their stories back to their classrooms and beyond. They simply get excited. And this excitement is contagious.

I myself play a small part in getting young people excited about science. Several years ago, the University of Tokyo asked me to start an international science institute in Tokyo. To attract young and ambitious scientists from around the world, I've raised five basic questions I've always wondered about from my childhood. How did the universe begin, what is it made of, what is its fate, what are its basic laws, and why do we exist in it. These questions resonate well with scientists from all cultures. We attract nearly a

thousand job applications for about ten positions we can offer every year. Now 60 percent of the members are international, roughly equally split among Asians, Americans, and Europeans. And we have our own Russians and Ukrainians, Chinese and Indians working together.

Also, I've lectured students from developing countries many times. Recently, I've given online lectures on our research on the universe, and attracted 75,000 people from 150 countries. They are from all over. Many of them are from the U.S., Europe, and Japan, but also from Pakistan, Western Sahara, the Bahamas, and Swaziland. They get excited to see that science now addresses these truly basic questions of humankind. And this way, they grow up knowing the methodology of scientific approach. This, I believe, is the key to making sure that future of whatever nation you are from can rest on the scientifically minded population.

I believe the world needs more places like CERN. Personally, I'd love to see the United States and Japan host similar international organizations for basic research, where people from all around the world come together. It will surely open up local population to a global mindset, especially the children. I'm eager to make sure that science contributes to peace and development of the entire planet.

To make it clear that the institute I founded in Japan is open to anybody irrespective of their origins, I named it the Institute for the Physics and Mathematics of the Universe. Laws of physics, and mathematics that describe these laws, are not only applicable to the entire planet Earth, but also throughout the whole universe. One day, I hope to see a job application from a different planet. I would think it is only a matter of time.

Thank you so much for your attention.