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SPECIAL EDITION	#12
Tokyo 1918 km.	September 2016 www.iync.org
Beijing 1123 km Rio de Janeiro 18182 km.	Buenos Aires 19506 km.
Istanbul 7967 km.	Shenzhen 1051 km. Moscow 6832 km.
Mail UDI 9446 Km.	
IYNC2016 and beyond	

Editorial

Dear IYNC community,

As the newly elected IYNC President I would like to welcome you to the 12th IYNC Bulletin. This issue marks the beginning of a new term for IYNC. A new leadership team was elected in July 2016 for the period 2016 - 2018. Innovation will be the focus of this term. Innovating for IYNC but also supporting innovation in nuclear science and technology.



There is a growing consensus that the global warming mitigation objective of limiting to a 2°C rise in global temperatures cannot be met without nuclear energy. This will be highlighted again by the #Nuclear4Climate initiative during the COP22 event in November in which IYNC, as co-founder of this initiative, will take an active role. The need for more nuclear is clear and several countries are going forward. Today, 446 nuclear power reactors are in operation and 63 are under construction. In China alone, where the IYNC2016 conference took place a few weeks ago, 21 reactors are under construction.

The last IYNC conference held in Hangzhou, China, was a unique chance to discuss the opportunities and challenges in nuclear science and technology. The conference, jointly organized with the Chinese Nuclear Society Young Generation Network (CNS-YGN), gathered more than 400 people and was a success. I encourage you to read the IYNC2016 special report in the next pages.

Personally, the main message I brought home is the urgency for innovation in nuclear energy. The energy world is changing rapidly and nuclear energy must adapt. Renewable energy development is booming and substantial energy storage possibilities are slowly becoming reality. The digitalization of energy systems and future use of big data are further transforming our energy landscapes. Those changes are challenges for nuclear energy but are also opportunities for innovation. Students and young professionals certainly have a role to play in capturing those opportunities. Some innovating solutions are already in development. Small modular reactors (SMRs), hybrid renewable-nuclear energy solutions, and accident tolerant fuel (ATF) are good examples. Innovation will also have to happen in other areas, such as, licensing, waste management and decommissioning. Successful projects will result in multi-disciplinary and multi-cultural initiatives requiring partnerships between various experts and cultures. With its network of 49 countries, IYNC has the potential to support innovation in nuclear energy.

IYNC2016 was also a unique opportunity to discuss the future of IYNC. The first IYNC Alumni event took place in Hangzhou where several ideas were discussed. A need to innovate within IYNC was also identified. In this new term, we will work to develop IYNC activities beyond the bi-annual congress. As an example we plan to develop an innovation contest, which you will hear more about soon. Other priorities will have to do with YGNs and BoD members' involvement and in preparing the future of IYNC with the midterm strategy.

In this context, we plan to create new IYNC committees: a communication committee, a bylaws committee and a strategy committee, in addition to the existing grant committee. For this, we are busy getting a team of more than 40 volunteers and I encourage you and your YGN to get involved.

"IYNC is what we make of it" reminded August Fern, IYNC founder, during IYNC2016. Let's make a great future for IYNC together!

Sincerely yours,

Denis Janin IYNC President

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IYNC BULLETIN #12 Special edition

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IYNC Newly Elected Officers



Denis Janin President

Mr. Denis Janin is nuclear engineer at E.ON since 2011. He was responsible of core design and safety analysis activities for the NPP Grafenhreinfeld until 2015. He then joined the department of energy economics at PreussenElektra, the nuclear subsidiary of E.ON, where he is charge of assets optimization, energy systems simulation and power hedging. Denis Janin is involved in the French Nuclear Society Young Generation (SFEN-JG) activities since 2010. He has held various roles and responsibilities within the SFEN-JG but also at the European (ENS-YGN) and international (IYNC) level.



Luca Capriotti Vice President

Luca obtained his MSc in Nuclear Engineering at the Politecnico di Milano (Italy) in 2012 with an experimental work performed at Institute for Transuranium elements (European Commission JRC-ITU). From 2013 to 2016 he worked at JRC-ITU on the topic of post irradiation examination of fast reactor metallic fuel for transmutation. From April 2016 he is working as nuclear fuel researcher at Idaho National Laboratory. He is affiliated as Phd student at TU-München.Luca got involved in IYNC in 2014. In IYNC2014 he was elected as Member at Large and he took part on the Executive Committee for IYNC2016 as Technical Program Chair. From July 2016 he is the Vice-President of IYNC.Luca is passionate about energy & policy, European institutions and building a strong network.

Jing Hu Executive Secretary

Jing recently got her doctor degree in Materials Science from University of Oxford where she worked in an international consortium on how to design better and safer nuclear fuel cladding alloys with Westinghouse and EDF. She later joined the IAEA working in the Fuel Cycle and Materials section, using her scientific background to promote nuclear knowledge across different member states. She has been working for IYNC since 2015, first as the Communication Chair for IYNC2016 in Hangzhou, China, now as the Executive Secretary for IYNC 2016-2018. She now lives in Chicago and works at Argonne National Laboratory, Nuclear Engineering Division.

AJ Lambert Treasurer

AJ Lambert received a BA in Electrical Engineering from the Pennsylvania State University. Following his studies, he began working for the Exelon Corporation as a Design and System Engineer at the at the Limerick Nuclear Generating Station outside of Philadelphia, PA, in the United States. Currently, AJ is studying to obtain a Senior Reactor Operator (SRO) license for two 3,515MWth Boiling Water Reactors (BWRs). In addition to his technical background, AJ recently graduated from Villanova University (Philladelphia, USA) with an MBA focused on Finance and International Business. He is very interested in learning more about the global business and diplomacy helping to safely expand nuclear power for the world's growing population.

IYNC 2016

The 9th IYNC conference took place in Hangzhou, China between July 24th and July 30th. IYNC2016 gathered more than 400 participants from 32 countries and was a broadly recognized success. The conference, hosted once every two years, is dedicated to young but also senior nuclear professionals, with the purpose of sharing knowledge and experience in a culturally diverse audience.

"Nuclear powering our life" was the theme of IYNC2016. The various aspects of nuclear science and technologies and role in our life were The collection of pictures here gives an overdiscussed. Several plenary lectures, panel discussions, interactive workshops and technical sessions were organized. The quality of the organized IYNC2018 will take place in Argentivarious sessions was highlighted by the partic- na. ipants.

Distinguished guest speakers, such as Mr. Zhimin QIAN, President of China National Nuclear Corporation (CNNC), Mr. Gavin LIU, Westinghouse President for Asia region and Mr. Dazhu YANG, IAEA Deputy Director General and head of the Department of Technical Cooperation delivered key messages to the IYNC2016 participants. They emphasized the importance of innovation in nuclear science and technologies and the opportunities the nuclear energy are opening to young professionals.

view of the atmosphere and diversity observed at IYNC2016. The next IYNC conference will be





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4 things I learned at IYNC 2016 in China

Last week of July, I was fortunate enough to fi- been in a plenary! I know that plenary speaknally attend my first International Youth Nuclear Congress. IYNC is a community of young professionals from around the world that gets together every two years to transfer knowledge role models in our industry, but young men also and promote nuclear technology. This year's need to see that women should be successful in conference was in Hangzhou, China. Besides meeting amazing people and listening to some great talks, here are my main takeaways:

Growth in the Chinese nuclear industry is real

China has already connected four new reactors to the grid this year and has 20 more under construction. I knew the magnitude of China's growth in the nuclear industry but it became even more apparent to me by seeing it first hand. The tone of this conference was different than that of the other nuclear-focused meetings that I've been to recently. In Europe, governments are phasing out nuclear energy and in the US, economics nication is indirect and very difficult to quantify. and subsidies are favoring natural gas and renewables over nuclear. But in China, nuclear is seen as essential to meeting the energy demand of a large and growing population. The sheer number of Chinese young professionals at this conference - and their excitement - proved the country's commitment to nuclear energy.

We need more female role models

While there were many female attendees at the Congress, from China and from around the world, there was not a single female speaker during any of the plenary sessions. We even had the Global President of Women in Nuclear speaking on a panel session, she should have

ers are usually determined by the sponsors, but some effort can be made to promote diversity. It's not only that young women, like me, need this industry.

By Lenka Kollar

Communication needs support and funding

My main presentation was in the communication panel session, and it was very well attended and fostered a great discussion among the attendees and panelists. One thing that became apparent is that everyone recognizes and agrees that communication and stakeholder involvement are important, but most organizations are unwilling to allocate the necessary human and financial resources to get it done properly. This is because the value added from good commu-

Be aware of the listening to talking ratio

I also participated in a workshop on World Wide Business, and we discussed the so-called "listening to talking ratio" between cultures. As the nuclear industry is becoming more and more international, it is essential for young professionals to be aware of the different ways in which culture communicate. For example, we can generalize that some cultures love to talk while others prefer to be polite and listen. Being aware of this and making sure that everyone is heard is important for effective intercultural teamwork.

Hope to see you at the next IYNC conference in Argentina in 2018!

LA YGN and IYNC



The Latin American Young Generation Network (LA YGN) was initiated in 2014 in Argentina, with a strong commitment to work for development in the region, promoting the peaceful uses of nuclear energy and reaching out to the non-technical public with a clear. accurate and fundamental message about what nuclear energy is.

The purpose of IYNC's delegation to Latin America in January 2016 was to develop and support the network for the integration of young people interested in the nuclear sector. The LA YGN is dedicated to similar goals as IYNC, such as promoting the peaceful uses of nuclear technology, increasing public awareness, establishing channels of communication and information flow between young nuclear researchers, and organizing conferences with nuclear experts in Latin America. However, we also have the possibility to build on these objectives and establish projects that we have not yet even imagined!

In the future, the further development of the Latin American Youth Nuclear Association will allow for regional integration of nuclear projects and activities. LA YGN has created a space for young Latin Americans to thrive and grow in this field. They are committed to maintaining and fostering a critical and objective view of nuclear activity in the world, along with the commitment to disseminate relevant information and technical objectivity. LA YGN hopes to generate the development of regional cooperation projects, which, in the long term and through generational change, will result in numerous benefits for the region.

The Latin American Network for Education in Nuclear Technology (LANENT) recognized the LA YGN as an organization and through this cooperation we started reaching out to young professionals throughout the region. LA YGN managed to contact numerous of in nuclear industries and research centres.

In this way, LA YGN have managed to have one representative from each participating country: Argentina, Brazil, Bolivia, Colombia, Chile, Ecuador, El Salvador, Nicaragua and Peru.

Under the Southern Cross

By Ekaterina Ryabikovskaya

In cold winter, an IYNC delegation took a trip to the warm south to view first hand the cradle of South American nuclear power industry.

During a short flight from Buenos Aires to Bariloche, there was only one thought I was turning over in my mind – why do my neighbors have warm jackets carefully folded on their lap? Buenos Aires had been melting with heat, with night temperature hardly falling below +32. Nathan Paterson, the fair-skinned delegate from Scotland, sat with his nose peeling and neck crimson with sunburn. All this just did not hang together.

IN THE FOOTSTEPS OF CAPTAIN GRANT

In the baggage claim area, it grew evident to me that there was something we had not been warned of. Everyone was wearing down jackets and caps. For once, I was happy to have been carrying my winter clothes from Moscow in a big heavy suitcase for the whole week. "By the way," said Cristian, a tall and robust redhead Argentinian, in a nonchalant tone. "It is a bit cold here." Cristian Vega was coming from a small city of Mar del Plata located 400 kilometers away from Argentina's capital. He had spent four years in Bariloche studying at the Balseiro Institute, and returned from Paris a couple of months before, where he got an MSc in Nuclear Engineering. He helped to bring together young nuclear engineers from across the globe for a trip to Latin America.

Shivering like leaves in our shorts and slides, we ran up to the nearest taxi. Having made ourselves comfortable on the backseats, we leaned back and were instantly struck dumb. Through the window, we could see the space: the Milky Way, breathtakingly beautiful and clear like a Hubble picture, the Magellanic Clouds, the Southern Cross, or Melipal, as the Mapuche people in Patagonia call it. The Coalsack Dark Nebula was also easy to discern. Cristian told about the tradition of local students to climb Mount Cerro Catedral, whose pointed tips resemble those of a Gothic cathedral. On the very top of it, they put up tents and spend the whole night contemplating the starry sky, imagining they are members of an expedition searching for Captain Grant in the Andes.

From the porch of the bungalow we stayed in, there was a magnificent view of Lake Nahuel Huapi, which stands for "Jaguar Island" in the Mapuche language. There is a legend telling about the spirit of the lake, a mysterious creature living on its very bottom (someone even claims to have seen it). However, the most incredible story related to the lake happened in reality.

THE SUN IN A BOTTLE

This happened on Sunday, 24 March 1951, shortly before the conference of the Pan-American Union's Foreign Ministers. Juan Domingo Peron, Argentina's President, made a sensational announcement to the press: "We have tamed the sun energy!" Then he introduced Ronald Richter, an obscure professor of Austrian decent who was heading the Argentinian nuclear project. A week after, Richter was awarded Gran Medalla Peronista, the highest state decoration of that time.

In a nutshell, Peron's speech was dedicated to the experiment carried out at a nuclear power facility on Huemul Island in Lake Nahuel Huapi. By means of a thermotron developed by Richter, the researchers initiated a thermonuclear fusion that resulted in a controlled release of nuclear energy. This had been achieved by using the processes similar to those running inside the Sun. Given the floor, Richter added that Argentina had achieved in the laboratory what Americans produced through an H-bomb explosion. That was a totally new method of generating nuclear power without materials previously thought indispensable.

According to Peron's words, the discovery made on Huemul Island would allow for selling energy bottled like milk. The global scientific community did not believe the news that a developing country of 16 million people had outperformed major superpowers and achieved the world's first controlled thermonuclear fusion. Multiple charges of fraud ensued from all around. Shortly afterwards, Peron appointed a group of researchers led by Jose Antonio Balseiro to carry out an investigation on the island. It did not take much time to expose the Huemul Project as a swindle. Richter left Buenos Aires in disgrace. This was the biggest scientific scandal of the century in Argentina, if not in the world.

Quite ironically, an abject failure gave rise to Argentina's scientific achievements. After exposing the fraud of Richter's experiments, Balseiro persuaded the president to carry all the costly equipment from the island to the not too distant Bariloche to finally make a truly worthwhile use of it. Oddly enough, this was the starting point for one of South America's most respected scientific institutes (later named after Balseiro). Nowadays, it is a part of Argentina's National Atomic Energy Commission, with the Bariloche Atomic Center located on its premises.



Enrichment plant
Heavy water production
Atucha-1 and Atucha-2
Atucha-3 (planned)
CAREM-25
Embalse npp

Ronald Richter flew all over Patagonia and

was deeply enchanted with Andean lakes. As a location for his thermonuclear project, he chose an idyllic place – Huemul Island 7 km away from Bariloche. The construction began in 1949. Surprisingly enough, the constructors dug out a coffin of Huemul, the last chief of the Manzeneros tribe, buried in 1900.

INTERESTING FACTS ABOUT INVAP PROJECTS

The SAC-D satellite (also known as Aquarius), built by INVAP for the Argentine Space Agency and launched into orbit on 10 June 2011, has created an online map of ocean salinity around the world, a key instrument to study climate changes. Salinity depends on the circulation of fresh and ocean water, a factor influencing climate as well. Besides, the satellite's meters can detect critical temperature surges on the planet surface, which allows for a better fire prediction.

Patagonia is a perfect place to develop wind power industry. Strong winds are consistently blowing here throughout the year. INVAP has developed heavy-duty wind turbines that can withstand a 150 km/h wind and extremely severe weather. The generators are ranging in capacity from 4.5 kW to 1.5 MW, the latter being used on the so-called wind farms.

INVAP has supplied cobalt therapy units to Marie Curie Municipal Hospital for Oncology in Buenos Aires and fully modernized its radiotherapy department. INVAP experts were in charge of the architectural and functional design of the building and did calculations to ensure a proper shielding in medical treatment rooms.

The Open Pool Australian Lightwater (OPAL) reactor built by IN-VAP is located in Lucas Heights, an Australian town 35 km from Sydney. OPAL is one of the world's most sophisticated research reactors and Argentina's best reactor exported on a turnkey basis. OPAL supplies radioisotopes to Australia and other countries, and irradiates silicon ingots to be used in microelectronics.



OUR WORLD IS BUT A HOLOGRAM

Along sunlit paths, we walked towards the Bariloche Atomic Center. It was hard to believe that people were doing research there. There were mountains, lakes and secular trees around, with colorful birds walking on the glades. The student camp was located nearby. Those willing to enroll on the institute have to go through a stiff entrance examination – only 30 out of 140–150 applicants are selected. The scholarship fully covers expenses on studies and residence. In addition, the students monthly receive a sum in cash equivalent to \$500. The conditions needed for study and research are fully in place. I asked a young man how one could sit at books with such beauty around. He replied that he should not get distracted: once you fail the exams, you flunk out. That is why the students spend most of the time in libraries, despite occasional hikes in the mountains.

We reached the reactor building. Commissioned in 1982, the RA-6 pool-type light-water reactor for research purposes became the first one fully manufactured in Argentina. It was built by INVAP, a hi-tech company founded 40 years ago as a branch of the Balseiro Institute. The core has a thermal power of 1 MW and is fueled by U-235 enriched up to 20%. RA-6 is generally used for study and research. However, it has a bunker built in 2002 for experimental treatment of cancer by using boron neutron capture therapy. Among the patients was even a dog cured of a tumor on the neck.

Next day we took a ride to INVAP. The company began as a supplier of research reactors and, in time, extended its product range. We were shown several rooms used for the most ambitious developments – space technologies. Among them is a three-storey high room with its walls and ceiling covered with meter long white spikes. It is used for testing satellites by imitating the acceleration and noise during a spacecraft launch, with the spikes acting as sound suppressors. In other rooms, there are smiling young scientists assembling microchips. The assembly is carried out in a spotlessly clean environment as a single fleck of dust or a hair getting into a microchip may ignite in space and deactivate the entire system.

Despite summer holidays, the place is buzzing with activity. A special device is rocking a satellite component back and forth to test its vibration resistance. A huge space probe is soaring up to the ceiling. Radars are spinning, and control panel buttons are flashing with all colors of rainbow. And somewhere in dark rooms, the solar batteries for future space-crafts are floating in zero gravity.

Over its existence, the Balseiro Institute in Bariloche has become an alma mater for many outstanding scientists. Among them was Juan Maldacena, a renowned physicist who shook the world in 1997 with a theory that the Universe is nothing but a hologram. Even if it turns out true, San Carlos de Bariloche is a hologram of extraordinary beauty.

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IYNC Trip to Latin America: Argentina



















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The China National Nuclear Corporation (CNNC) is a main part of the national nuclear technology industry and a leading element of national nuclear deterrent force, nuclear energy application for peaceful use and nuclear technology innovation and marketing. It undertakes missions to ensure national security, protect ecological environment and safeguard human health.





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CNNC Industry layout



Nuclear Industrial System



