MESSAGE FROM THE PRESIDENT OF THE COUNCIL

CERN began the year 2016 with a new Director-General and a new President of Council, a rare coincidence but one that allowed me to forge a very strong relationship with the new Management team. Over the course of the year, the Council and the Management worked together in a very open and transparent way to advance the work of the Laboratory.

The highlight of the year at CERN was undoubtedly the exceptional performance of the LHC, the whole accelerator chain, the experiments and the computing. All worked in perfect harmony to deliver science of the highest calibre. The LHC was made possible by combing the resources of many nations, but these results could not have been realised without the concerted efforts of individuals. Such hard work does not go unnoticed, and I would like to express my gratitude, on behalf of my colleagues in the Council, to all the people who contributed to making 2016 such a success.

The healthy breadth of the CERN programme is illustrated by many new results in other research areas. To name but a few, these include the experiments at the Antiproton Decelerator and the ISOLDE radioactive beam facility, the proton-driven plasma wakefield experiment AWAKE, and the climate research experiment CLOUD. These experiments, many of which can be done only at CERN, show how the Organization strives to make the best possible use of its infrastructure, maximising the scientific return on investment.

In terms of Council business, the most important achievement of 2016 was ensuring the future success of the LHC via the formal approval of the High-Luminosity LHC project, the HL-LHC. Scheduled to come on stream in 2025, the HL-LHC will give the LHC experiments greater precision, as well as an improved discovery potential through to 2035.

The Council also worked towards a secure future across the full range of CERN research by making the first preparations for the next update of the European Strategy for Particle Physics. The work is getting under way now, and much of the relevant information is expected to be on the table by the end of 2018, with discussions in the European particle physics community taking place in 2019. The updated Strategy will be presented to the Council in spring 2020.

CERN's membership also continued to grow during the year, with Romania becoming a new Member State. Cyprus became an Associate Member in the pre-stage to Membership, and Ukraine became an Associate Member. The Council voted to admit Slovenia as an Associate Member in the pre-stage to Membership and India as an Associate Member, with the expectation that the relevant national authorities will ratify these Associate Memberships in 2017. It was my great pleasure to welcome them all. Collaboration is the lifeblood of progress, and it is always gratifying to see that the CERN ideal of uniting diverse nations and peoples remains attractive in today's rapidly evolving world. Great things come through unity.

Finally, I'd like to single out two of my colleagues on the Council. 2016 saw another rare double transition as Tatsuya Nakada and Charlotte Jamieson stepped down as Chairs of the Scientific Policy Committee and the Finance Committee respectively. I would like to thank them both warmly for their many years of service, and to welcome Keith Ellis and Ossi Malmberg as their successors.

When I was elected as President of Council in September 2015, I remarked that CERN was full of ambition and in an excellent position to move particle physics forward with the LHC in full swing. One year into the job, I can only underline how true that is.

Sijbrand de Jong

MESSAGE FROM THE DIRECTOR-GENERAL

2016 was an excellent year for CERN research and for all aspects of the Organization's activities. It began with organisational changes introduced by the new Management. To CERN's three sectors, Research and Computing, Accelerators and Technology, and Finance and Human Resources, we added a fourth, for International Relations, bringing relations with the Member States, geographical enlargement, and education, communications and outreach all together under one roof.

The LHC surpassed its design luminosity in 2016 and ran with metronomic regularity. Ably served by the injectors, the LHC delivered data for physics for 50% of its running time, an unprecedented achievement for any accelerator at the high-energy frontier, let alone one so complex. This allowed the ATLAS and CMS experiments to record over 50% more data than their target for the year and provided all the LHC experiments with a rich resource to search for new physics and explore the physics landscape with ever-greater precision. More data bring greater challenges for the computing infrastructure, which performed admirably in 2016, with about 50 petabytes of LHC data recorded, average data transfer rates of 35 gigabytes per second and two million jobs per day being run. Greater precision implies more work for the theorists, who are providing increasingly precise calculations for comparison with the emerging experimental results.

The LHC was not alone in delivering a harvest of exciting results, as the year saw highlights across the full scientific programme. For example, the ALPHA experiment provided the first measurement of spectral lines of antihydrogen, while the CLOUD experiment continued to produce valuable data for climate modelling. The extension of the North Area hall, which hosts part of the CERN neutrino platform, was completed in 2016, and excellent progress was made on the refurbishment, development and construction of detectors for neutrino experiments in the US and Japan.

The full exploitation of the LHC is our highest priority for the short to medium term, and I am grateful to the CERN Council for its formal approval of the high-luminosity upgrade, HL-LHC. A European Investment Bank credit facility, also agreed in 2016, will allow the upgrade to be financed within a constant CERN budget without compromising or delaying the rest of the scientific programme. Looking further ahead, the CLIC, FCC and AWAKE projects all took significant steps forward in 2016, with AWAKE demonstrating the self-modulated instability of proton beams traversing a plasma cell as the first step towards plasma wakefield acceleration of an electron beam.

Education and training are always highlights of the CERN programme. In 2016, some 1600 young people received high-quality training through a range of programmes including the fellows, doctoral students and summer students programmes. In 2016, the number of participants in CERN's high-school teacher programmes passed the 10 000 mark, while the number of visits from members of the public continued to grow. Over 120 000 people visited CERN during the year.

Underpinning all this is our commitment to upholding the highest standards in health, safety and environmental protection. 2016 was no exception, with the establishment of a CERN Environmental Protection Steering board and the achievement of great progress in the safe elimination of low-level radioactive waste.

Last but not least, the CERN family continued to grow in 2016, with Romania becoming CERN's 22nd Member State. Cyprus became an Associate Member in the pre-stage to Membership, and Ukraine became an Associate Member.

This is just a snapshot of CERN's diverse and exciting programme. I hope you'll enjoy learning more in the following pages of this report.

Fabiola Gianotti