

# HiLumi LHC

FP7 High Luminosity Large Hadron Collider Design Study

## Presentation

# The LHC: a week for taking stock, pushing boundaries and for long-term planning

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## THE LHC: A WEEK FOR TAKING STOCK, PUSHING BOUNDARIES AND FOR LONG-TERM PLANNING

This has been a week full of LHC news, beginning and ending in Paris with results presented by the ATLAS, CMS and LHCb collaborations at the Hadron Collider Physics Symposium, HCP2011. In between came the first lead-ion collisions of 2011, tests with protons and lead-ions circulating in the LHC, and the kick-off meeting for an LHC luminosity upgrade.



HCP2011 brings this year's particle physics conference cycle to a close, and is the last chance for the LHC experiments to present new results before the December Council meeting. It began with all eyes on LHCb's results from its D<sub>0</sub>-anti D<sub>0</sub> particle asymmetry analysis. In this decay channel, LHCb seems to see an excursion from the Standard Model's prediction. However, even though such a result is precisely what physicists have been waiting for, no predictions for physics beyond the Standard Model show an excursion in this particular decay channel. So it's safe to say that the jury's still out, and with about half the data remaining to be analysed, we'll have to wait and see what story the full data set tells. At the end of the conference, ATLAS and CMS presented a combined Standard Model Higgs search for the first time, based on the data that had been collected up to August. The combined analysis constrains the Higgs to the mass range 115 GeV to 140 GeV.

Meanwhile, the LHC achieved a seamless transition from proton to lead-ion running, and added a new feather to its cap with preliminary tests designed to show the feasibility of proton-lead collisions. These tests show that achieving such collisions next year should be possible, adding a valuable new tool for studying quark gluon plasma.

Looking further ahead, the High Luminosity LHC workshop held at CERN this week formally kicked off the process that will lead to a significant increase in

luminosity for the LHC's second decade of running, starting sometime after 2020. Work at CERN, in the US by the US LHC Accelerator Research Program (LARP), and at KEK in Japan has been ongoing for some time, developing the technologies needed for new magnets, power transmission systems and RF cavities. Thanks to funding from the European Commission's seventh framework programme, FP7, these efforts can now be brought together under a global umbrella in which some 14 European institutions are also involved. CERN's bid for FP7 funding received the maximum possible score: a clear signal of the quality of the project and the importance that Europe places in CERN and the LHC.

This week exemplifies much that's good about particle physics: results that challenge our preconceptions; feats of engineering that challenge the limits of the possible; and long-term planning with a global vision. Here's looking forward to many more such weeks.

*Rolf Heuer*