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The LHC RF: Experience with Beam Operation

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The LHC commissioning with beam and the first two years of physics operation, 2010 and 2011 as seen by the RF system are presented with particular emphasis on the encountered problems and solutions. It became clear in early 2010 that RF noise was well under control: the crossing of the much feared 50 Hz line for the synchrotron frequency did not affect the beam. The LHC RF noise is reduced to a level that makes its contribution to beam diffusion in physics well below that of Intra Beam Scattering. Capture losses are also under control, at well below 0.5 %. Longitudinal emittance blow-up, needed for stability, was rapidly commissioned. In 2011, 3.5 TeV/beam physics has been done with above 1380 bunches at 50 ns spacing, corresponding to 55% nominal current. The intensity per bunch (1.3E11 p) is significantly above the nominal 1.15E11. By August 2011 the LHC has accumulated more than 2 fb-1 integrated luminosity well in excess of the 1 fb-1 target for 2011.

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