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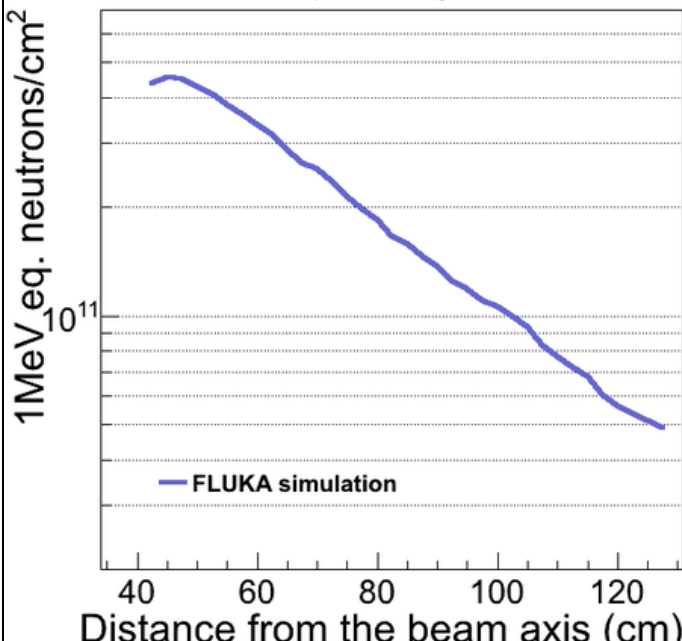
CMS-DP-2012/028

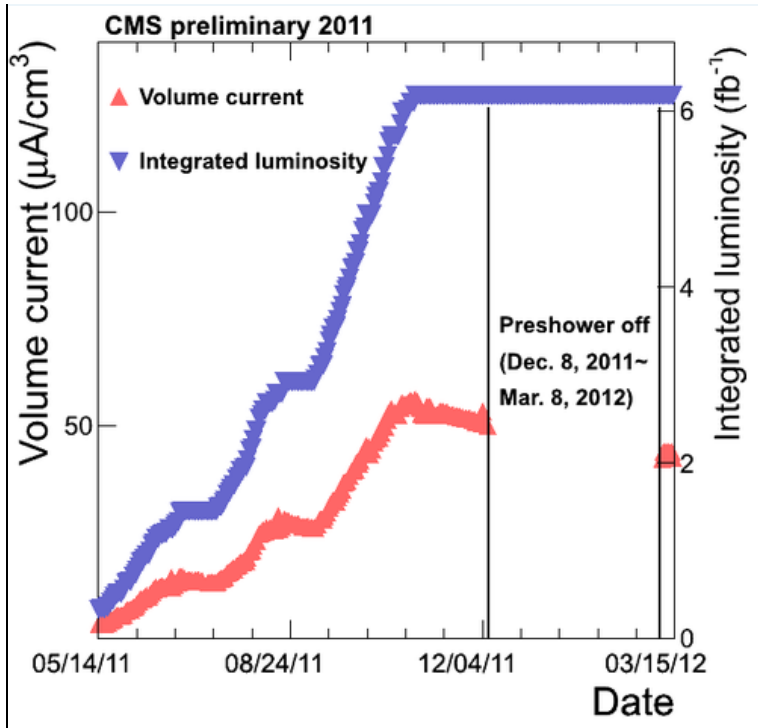
Preshower bulk leakage current measurements

Abstract: Plots of the Preshower bulk leakage current measurements vs time and integrated LHC luminosity for data taken during 2011 and early 2012. Comparisons to predictions from a FLUKA simulation are also shown.

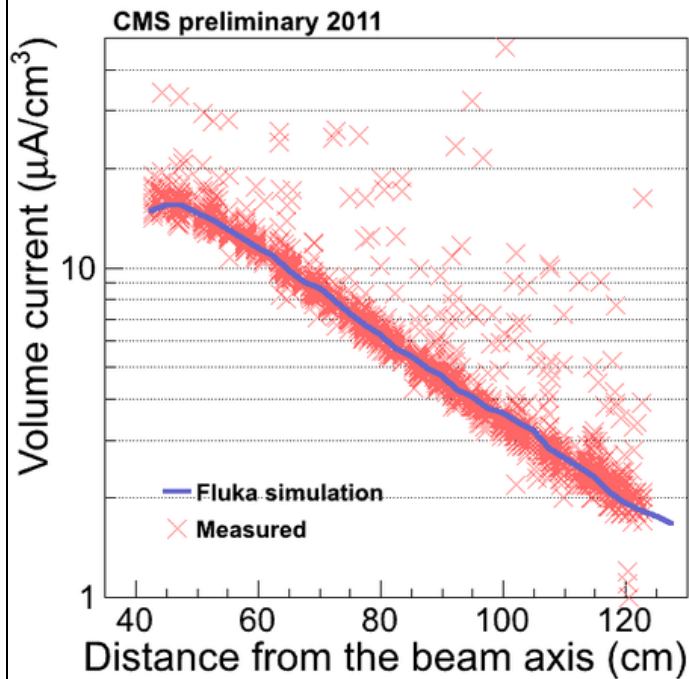
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Figure	Caption
<p>pdf version</p> <p style="text-align: center;">CMS simulation preliminary</p>  <p>1 MeV_{eq.} neutrons/cm²</p> <p>Distance from the beam axis (cm)</p> <p>— FLUKA simulation</p>	<p>The FLUKA package was used to simulate particle rates across the whole CMS detector. The particle fluence was derived from the Monte Carlo simulation using events generated by DPMJET3. The radiation damage to silicon from each particle is scaled to the damage from a 1 MeV neutron, based on known bulk damage behavior properties. The calculated fluence has a maximum at R = 45 cm (eta ~ 2.6) corresponding to a value of 4.53×10^{11} n/cm² for 1 fb⁻¹ of data.</p>
<p>pdf version</p>	<p>Measured volume leakage current and integrated luminosity as a function of time calculated for 1 cm³ of silicon at a distance of 45.0 cm from the beam line. Data from 2011 and early 2012 is used.</p>



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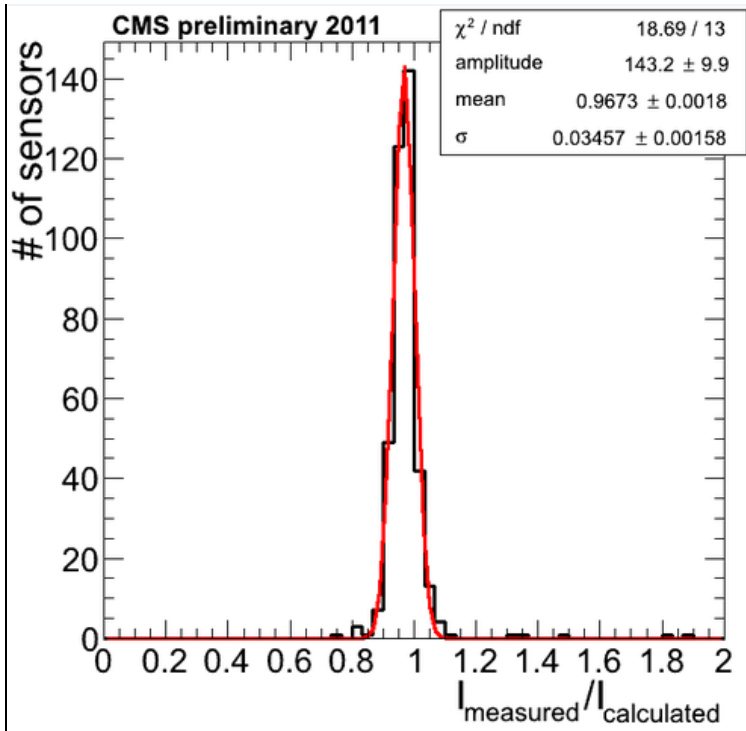


Volume leakage current measured as a function of the distance from the beam axis, after an integrated luminosity of 6.17 fb^{-1} .

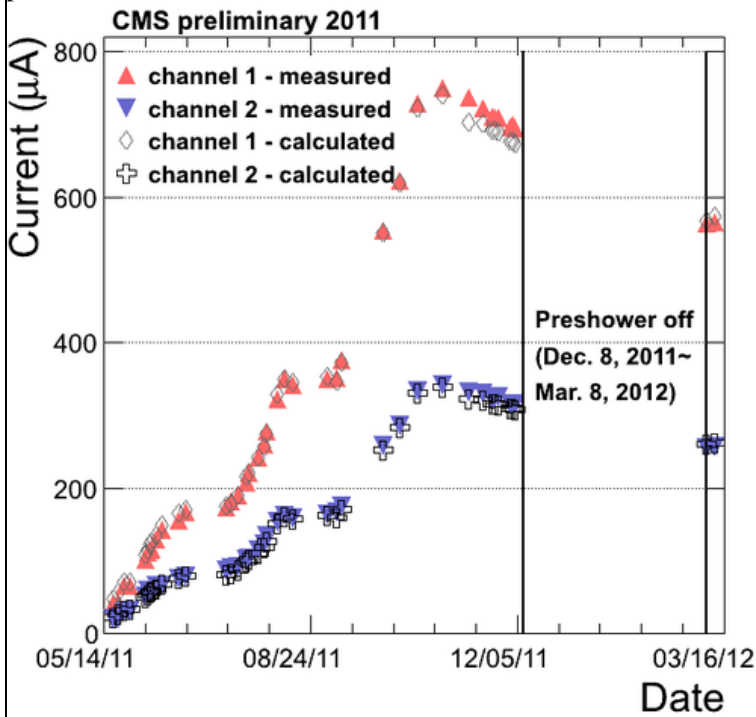
The solid line indicates the expected values based on Fluka simulations and calculations of the Hamburg model for 0°C . The measurements were carried out at 18.9°C , but the data are converted to the equivalent currents at 0°C . Points far from the blue line are due to sensors with excess surface currents.

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Ratio of the measured to calculated sensor leakage current. The 5 events with a ratio above 1.3 are believed to come from sensors suffering from excess surface currents. The mean value and the rms refer to the Gaussian fit. The plot includes sensors from one specific producer only.



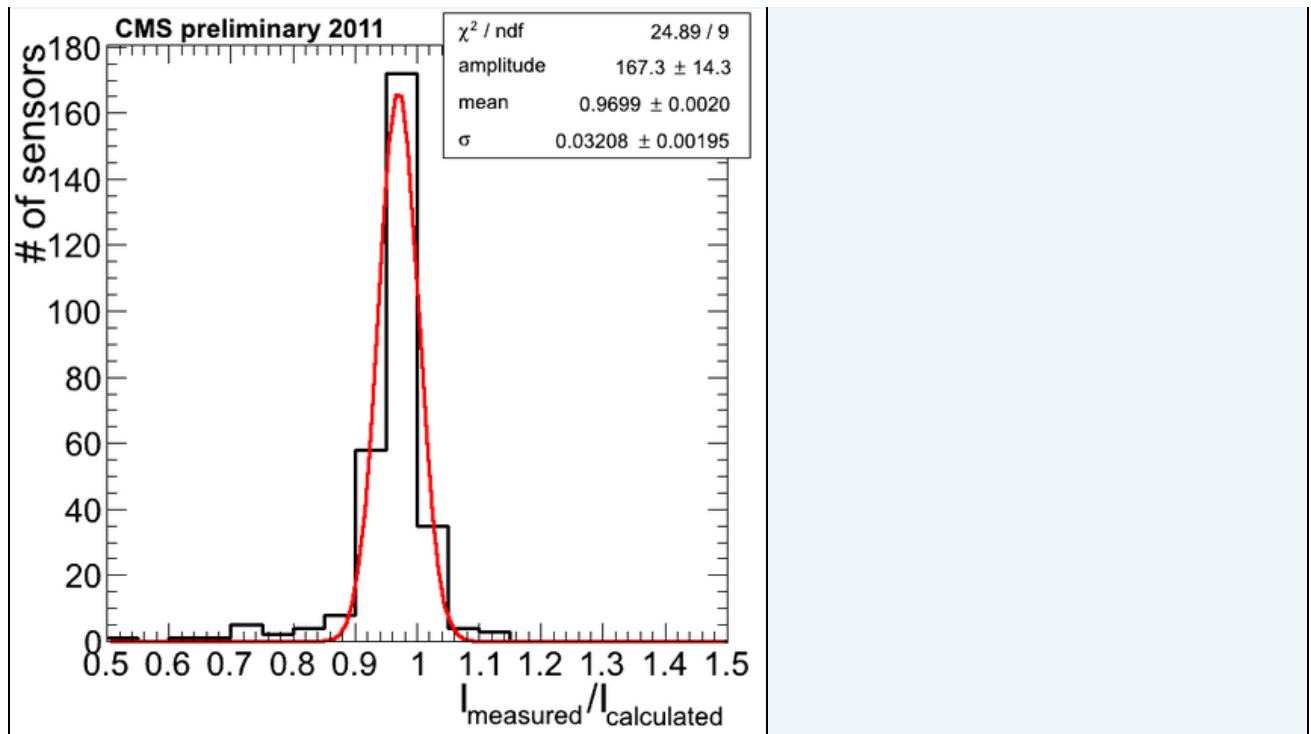
pdf version



Current measured on 2 high voltage channels supplying 28 and 7 sensors for channels 1 and 2, respectively, as a function of time. The open symbols represent the calculated current as a function of time based on the Hamburg model. The calculated current was scaled to the current measured for each channel on October 29, 2011, at the end of the proton run.

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Ratio of the measured to calculated leakage current for the 8 high voltage channels, for multiple measurements performed in 2011. The Gaussian fit gives a mean of 0.97 and an rms of 0.03.



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