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Experiments of laser pointing stability on paper, metal and ceramic surfaces to validate micrometric positioning sensor

The CLIC study requires 10 micrometers precision and accuracy over 200m for the pre-alignment of beam related components. A solution based on laser beam as straight line reference is being studied at CERN. It involves camera/shutter assemblies as micrometric positioning sensors. It includes reference targets on the shutter in order to compute the coordinates of the laser spot centre from camera plane to shutter plane. To validate the micrometric positioning sensors, several parameters have to be examined. First, the most appropriate reference targets on the shutter have to be selected in terms of implementation and measurement of targets. Second, laser pointing stability has to be analysed with different types of shutter surfaces. Experiments are carried out with paper, metal and ceramic surfaces. This paper presents the standard deviations of the laser spot coordinates obtained on the different surfaces, as well as the measurement error. It also provides an estimate of the achievable precision and accuracy of the determination of the laser spot centre with respect to the reference targets.

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