



Longitudinal and Transvers Beam Measurements at ALBA

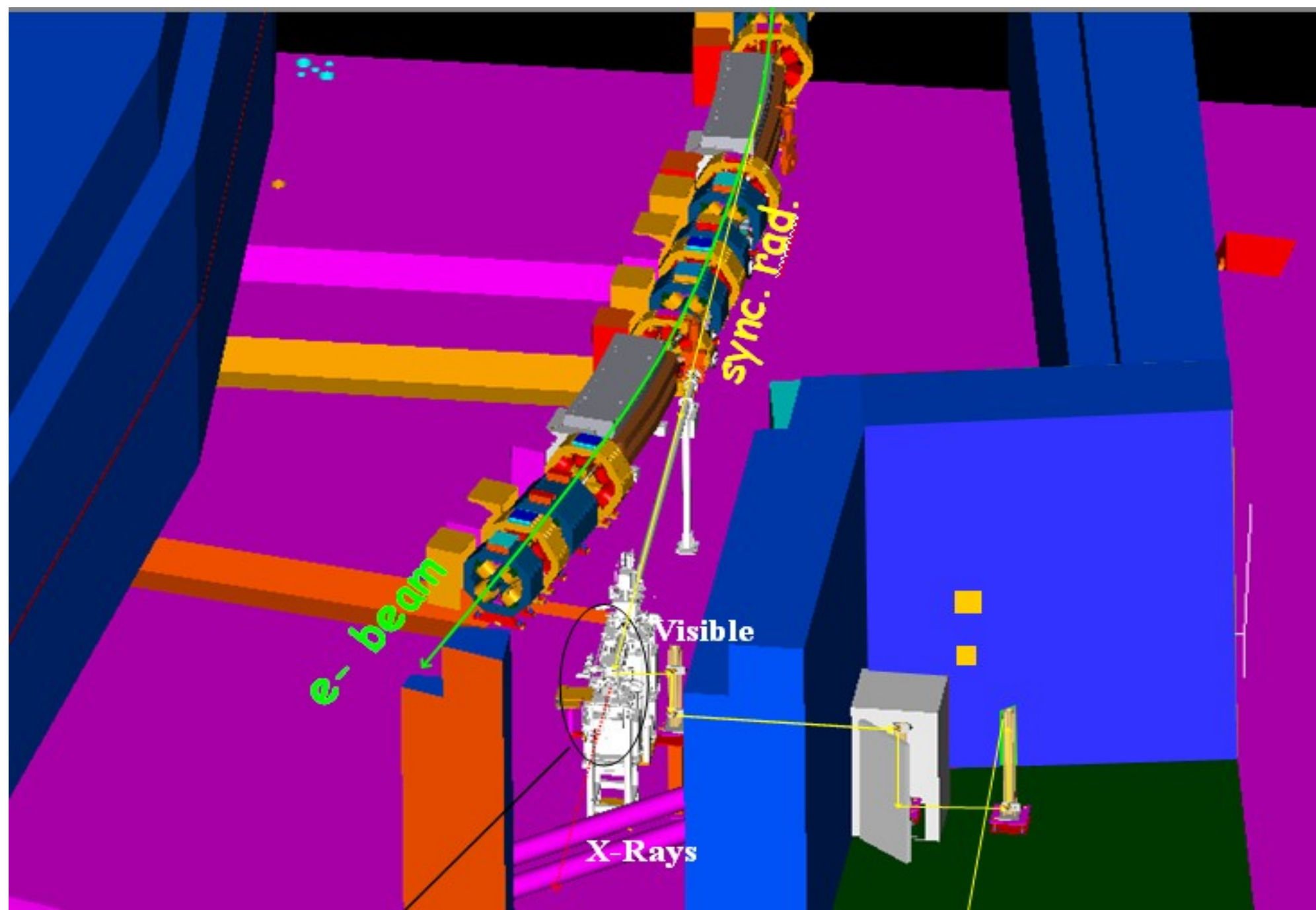


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Abstract

In Synchrotron Light Source machines as ALBA, it is necessary to continuously monitor beam characteristics in order to guarantee a good quality and stable radiation for users. Moreover, special non invasive diagnostic tools are used to have precise real time measurements, and complete understanding of the machine performances. Visible Synchrotron Light it self is exploited to perform many of these measurements and a dedicated beamline, Xanadu, equipped with different electro-optical devices are located, is used.

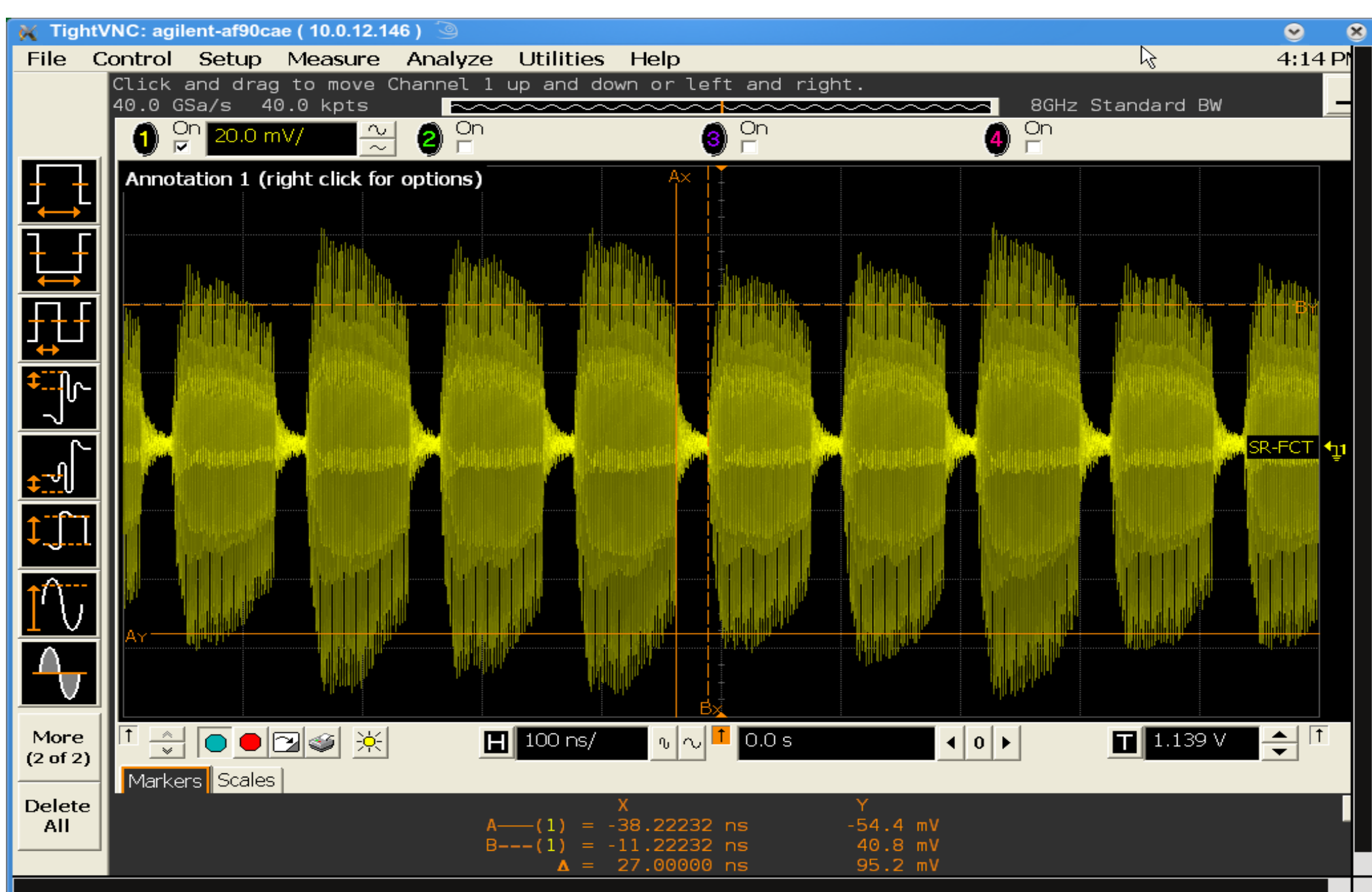


Xanadu

Xanadu is the ALBA diagnostic beamline . Synchrotron Radiation comes from the bending magnet located in Sector 1 of the Storage Ring (BM01), visible light is collected and guided out from the shielding by a system of seven mirrors. A lens may also be used to focus the photon beam. The diagnostic instrumentation comprehends:

- Streak Camera: Precise bunch longitudinal size measurements
- PMT and PicoHarp300: Time Correlated Single Photon Counting and future Bunch Purity measurement
- Fast Gated Camera: future bunch by bunch Interferometer Beam Size measurement

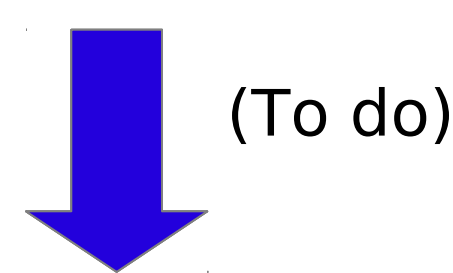
FCT Filling Pattern Measurements



Data Treatment

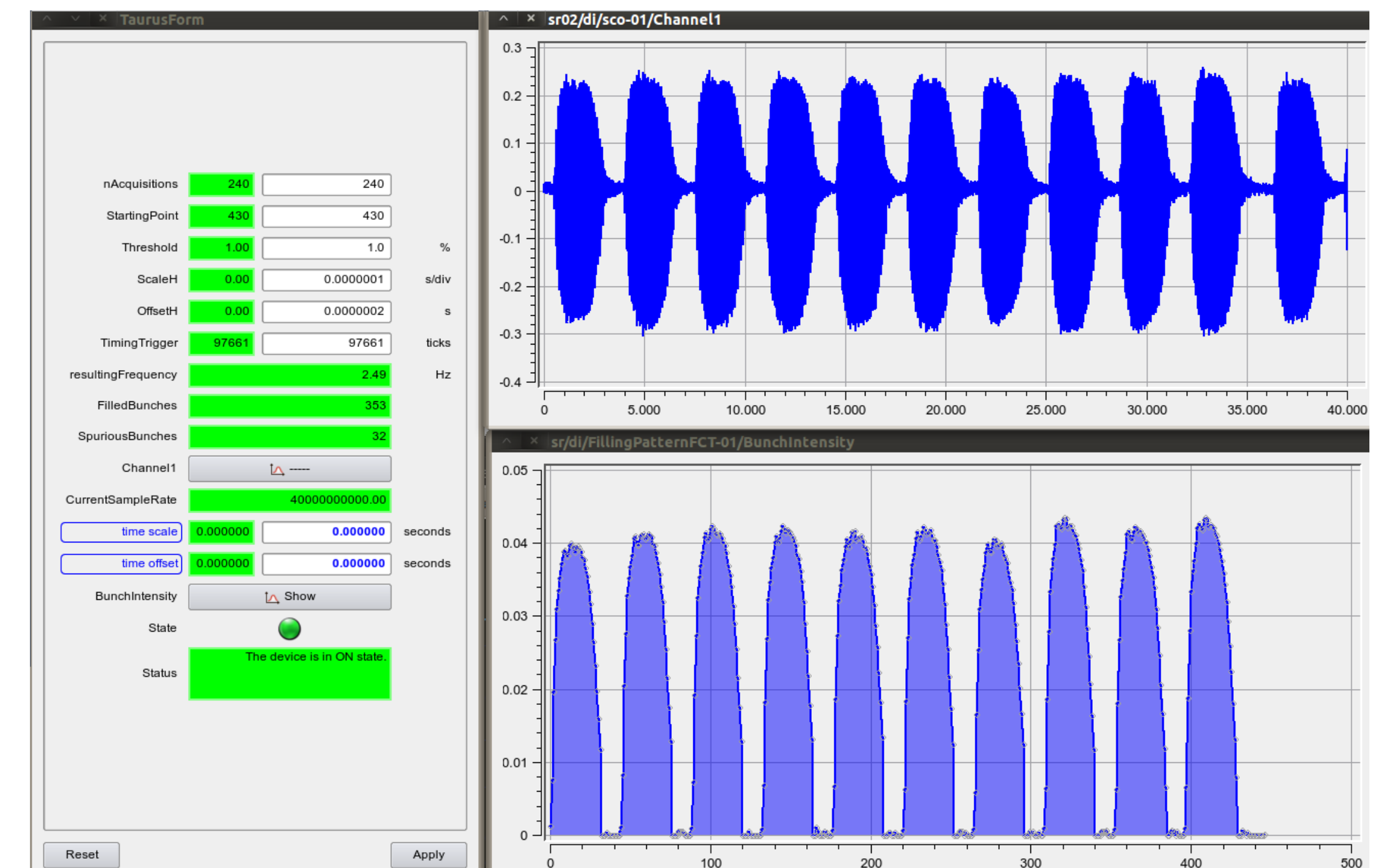


Achieved resolution: 2%



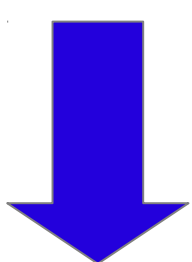
TCSPC

Expected resolution 10^{-4}



Beam Size Measurements

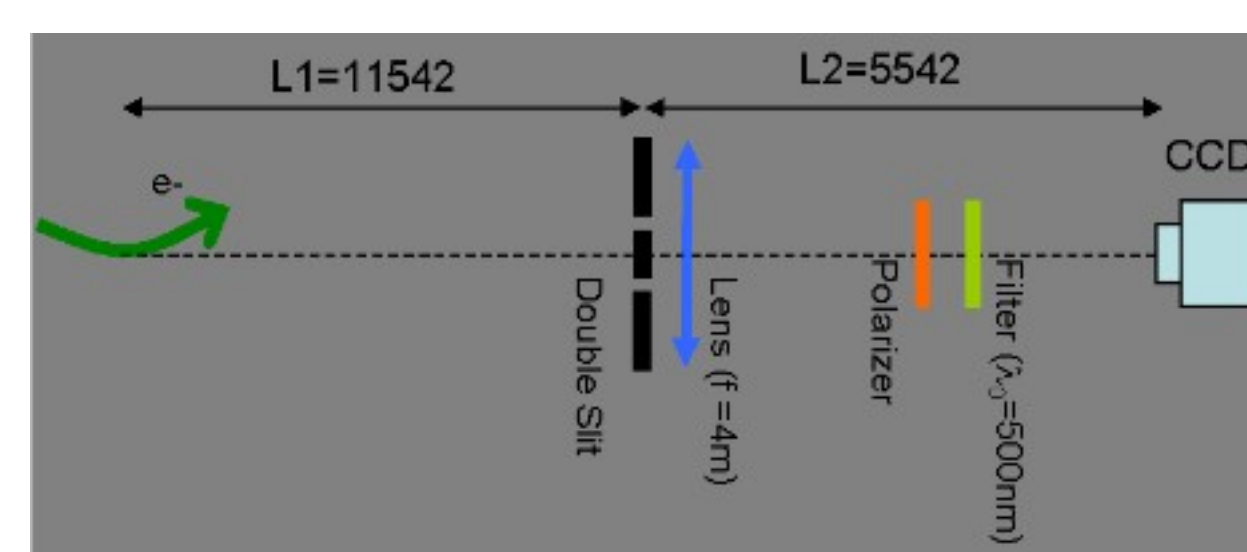
Synchrotron Radiatio Monitors are not enough to measure quantitatively the beam size because of diffraction limits.



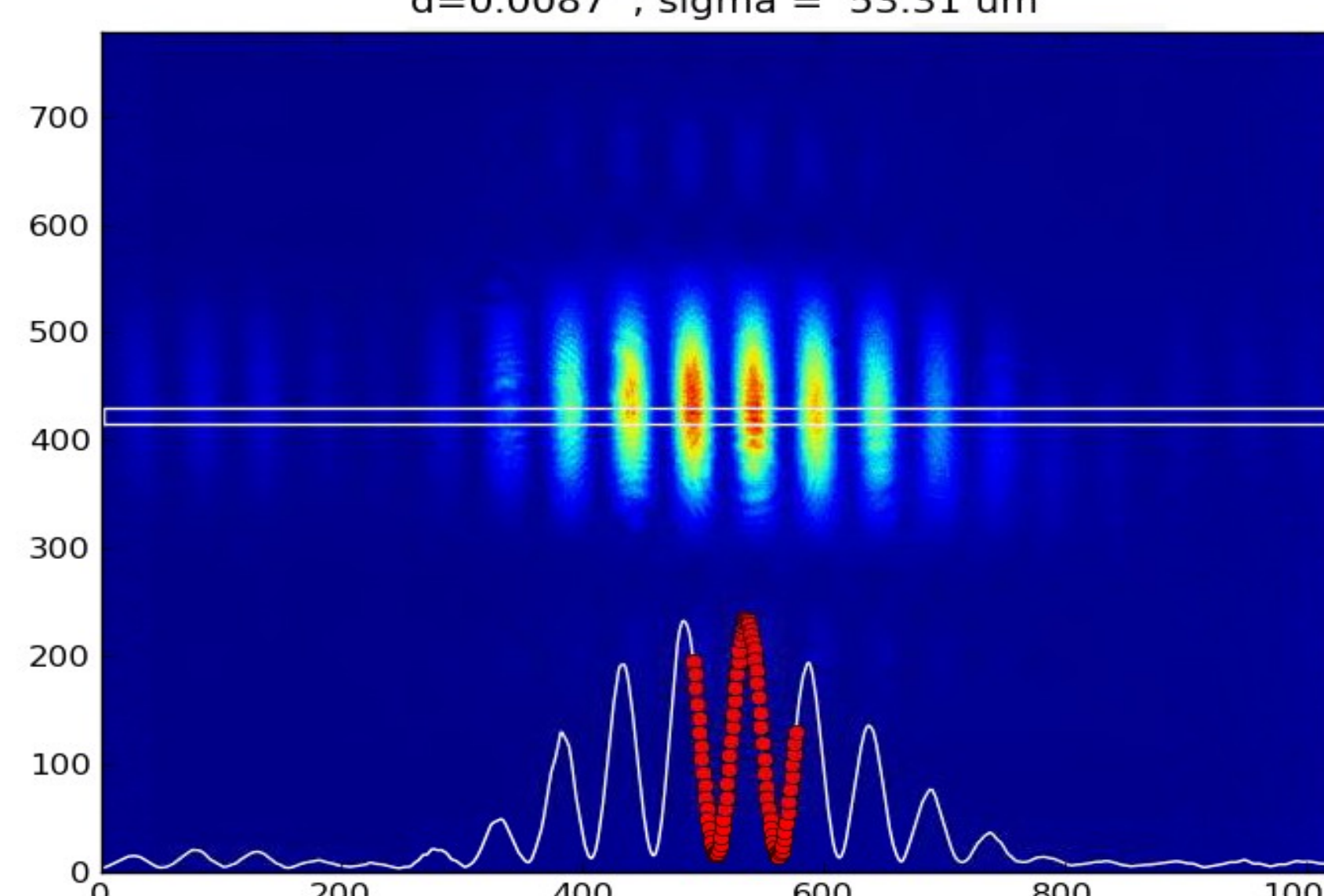
A Fast Gated Camera (FGC, model Redlake HG100K, by Proxitronic) is loaned by CERN to CELLS in order to probe the possibility of perform bunch by bunch beam size measurement by interferometer technique . This method may be possibly used in the future CLIC Damping Ring, which physical specification are close to the one of the ALBA facility .

FGC contains a fast photocathode module that can be gated down to 3 ns, enough for bunch by bunch measurement (bunches are separated by 2 ns).

CCD Preliminary Measurements



$d=0.0087$; $\sigma = 53.31 \text{ um}$



Preliminary measurements proved the possibility to perform this kind of measurement at ALBA. SRW simulations will be performed to improve the optical settings. Other requirements for precise bunch by bunch measurements are:

- Timing System development
- Optical components choise and mantenement
- Data Analysis tools

Possible appilcation of the interfermoeter tecnique to other machines (LHC, CLIC) will be studied and possibly experimented.