2. Design of the data acquisition system

Fig. 1(a) shows a scheme of the data acquisition system. The main components are a programmable microcontroller and a high-voltage amplifier. The microcontroller acquires detector signals, where each signal marks an individual data acquisition

frame. The duration of the frame can be directly set by the detector control software. The rising edge of each signal is automatically detected and used by the microcontroller to

switch the output low voltage between pre-programmed sequential values [as shown in Fig. 1(b)]. In other words, the detector and the microcontroller operate in the master/slave

mode, respectively. The output signals from the microcontroller are forwarded to a high-voltage amplifier, while the output of the amplifier is directly connected to the electric

field cell. The time resolution of the experiment is solely defined by the detector frame acquisition time: the used version of the PILATUS-2M detector provides

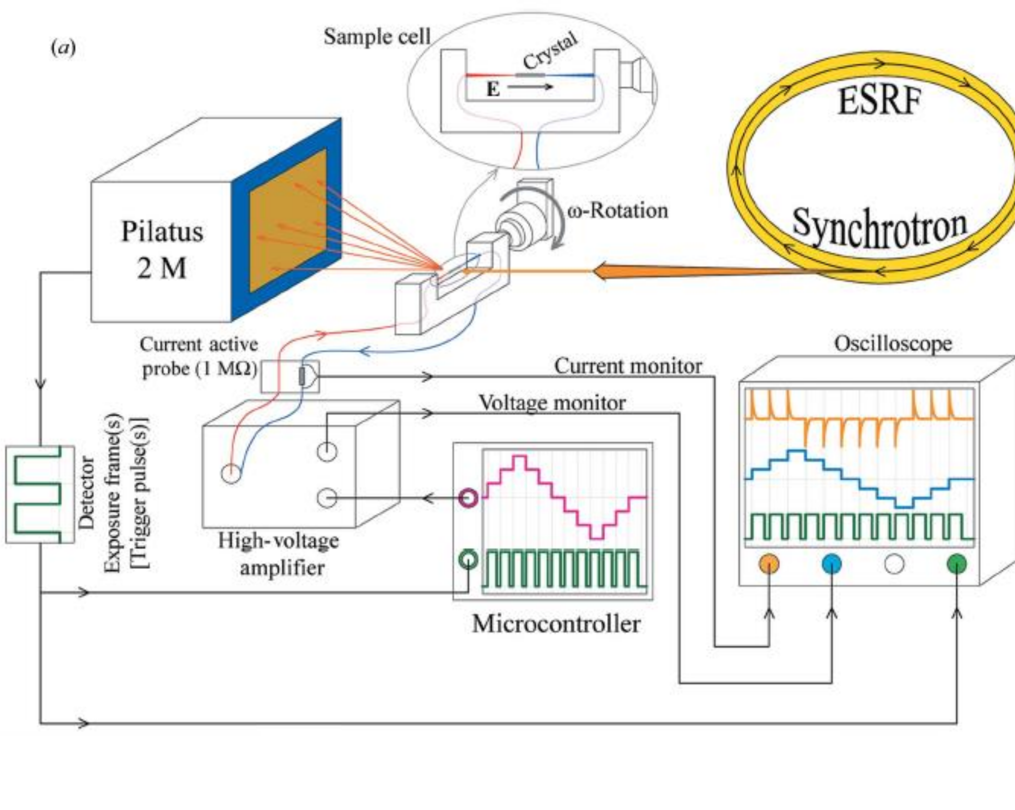
the smallest frame width of approximately 33 ms.

3. Testing the data acquisition system We tested the data acquisition system by measuring the

intensity of X-ray scattering from a commercial PIN–PMN–PT ferroelectric single crystal. The crystal had a cylindrical shape with a diameter of 0.1 mm and an edge length of

1 mm. It was mounted into a custom-built sample cell to apply an electric field along

the pseudo-cubic [001] direction. The electric current through



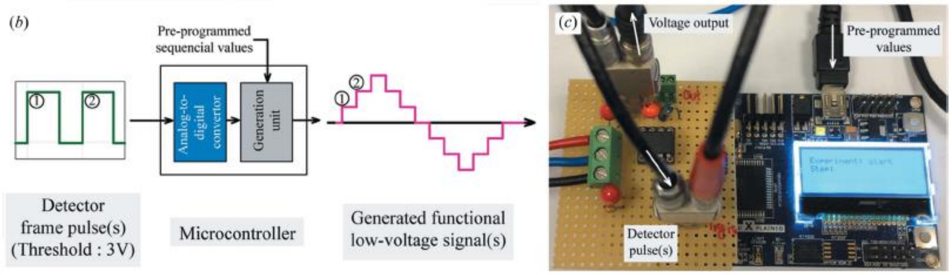


Figure 1

Schemes (*a*), (*b*) and a photograph (*c*) of the presented data acquisition system. The pixel area detector (*e.g.* PILATUS-2M) generates rectangular signals, which mark the beginning of a new data acquisition frame. The microcontroller acquires these signals and switches the output voltage every time their rising edges overshoot 3 V (*b*). The electric (capacitive) current flowing through the crystal is measured using a serially connected 1 MΩ active probe.