ESRF	**Experiment title:** In situ ferroelectric domain wall motion induced by a polarized light studied from diffuse scattering.	**Experiment number**: MA-2674
Beamline: BM 25A	**Date of experiment**: from: 11-Feb-2016 to: 14-Feb-2016	**Date of report**: 13-Nov-2018
Shifts: 9	**Local contact**: Dr. Eduardo Salas	*Received at ESRF:*

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Report: The experiment focused on determining the domain structure change in a ferroelectric crystal as a result of an illumination with a visible light. This experiment evidenced that a reversible optical change of ferroelectric domains configuration is possible. The results of this experiment have been published in a top-ranked journal with the following reference:

F. Rubio-Marcos*, D. A. Ochoa*, A. Del Campo, M. A. García, G. R. Castro, J. F. Fernandez, and J. E. García*. (* indicates experimentalists)
Reversible optical control of macroscopic polarization in ferroelectrics.
Nature Photonics 12, 29-32 (2018)

This work has been selected as one of the most exciting subjects investigated at the ESRF over the last years and will be included in the next issue of the ESRF Highlights 2018. Due to the editorial policy of the journal, we do not sent this report until the paper was published by the journal.

Abstract of the published letter:

The optical control of ferroic properties is a subject of fascination for the scientific community, because it involves the establishment of new paradigms for technology. Domains and domain walls are known to have a great impact on the properties of ferroic materials. Progress is currently being made in understanding the behaviour of the ferroelectric domain wall, especially regarding its dynamic control. New research is being conducted to find effective methodologies capable of modulating ferroelectric domain motion for future electronics. However, the practical use of ferroelectric domain wall motion should be both stable and reversible (rewritable) and, in particular, be able to produce a macroscopic response that can be monitored easily. Here, we show that it is possible to achieve a reversible optical change of ferroelectric domains configuration. This effect leads to the tuning of macroscopic polarization and its related properties by means of polarized light, a non-contact external control. Although this is only the first step, it nevertheless constitutes the most crucial one in the long and complex process of developing the next generation of photo-stimulated ferroelectric devices.