

**A Report on Progress in preparation of the
"Cluster Jet Target Control Final Design Report"
milestone M7 (FDR) of the In-Kind Contribution
of NCBJ to FAIR- Panda**

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1. Delivery of Part I to a group of responsible experts

On March 17, 2021 Part I of the "Cluster Jet Target Control Final Design Report" has been delivered to a group of responsible PANDA experts and in response to their critical remarks Part I (revised) delivered on 24.03.2021, while on 19.05.2021 the text has been supplemented with some fine adjustments. This Part I contains a detailed account of elements of the cluster-jet target and the cluster-jet beam-dump to be controlled/ reported to the supervisory PANDA detector control system. In my personal opinion this part of the Final Design Report is already successfully terminated.

2. The present status of Part II.

Immediately after the first delivery of Part I started writing of Part II. Section 3 starts with the general scheme of the control logic. Section 3.1 is devoted to CompactRIO's FPGA and its functions. We explain, in particular in 3.1.1 Reasons to embark a microprocessor on board of FPGA. In 3.1.2 we describe features of the employed MicroBlaze™ processor of Xilinx Inc., in particular its registers. Sect. 3.1.3 makes a detailed account of communication between MicroBlaze core and its memories, in particular with FPGA's Block RAM (BRAM). The text illustrates the flow of instructions and data along the Local Memory Bus (LMB) between the instruction and data memories and the Instruction and Memory Sides of the MicroBlaze core. Making this part properly working required a significant effort, the text of Part II followed an advancement of FPGA's understanding and its programming.

3. The current developments

Currently, the elements in LabVIEW connecting on the one hand the MicroBlaze with the C-modules and with the real-time part on the other are programmed.

The text of Part II will follow after a visible progress along this way is achieved.

The audience would learn more on the current developments from the planned presentation of Jerzy Tarasiuk, who was not able unfortunately, to prepare and deliver it because of the odd consequences of an anti-Covid 19 vaccination.

We have declared to Lars the 1st September 2021 as a realistic date of the Milestone M7 (FDR) completion. We are making our best to make this promise come through.

4. Forecasts for the next Milestone M8

There is an element of our activities to be qualified as an optimistic forecast for the next Milestone M8. There is a team in our Institute, which declared a will to participate in the Target Control project. Their intentions are to design and assemble an emulator of the Beam-Dump and Generator devices.

This is going to be a testing ground for the Cluster Jet Target Control program prototype, an object of Milestone M8.

THANK YOU FOR YOUR ATTENTION !!!