eRD109 update: dRICH RDO

from the dRICH RDO team:

Pietro Antonioli, Davide Falchieri, Sandro Geminiani, Matilda Panza,
Luigi Rignanese, Giovanni Torromeo

ePIC DAQ meeting
12 February 2026

2026 dRICH RDO calendar

28 March 2026: RDO irradiation tests at Trento

27 May – 3 June 2026: test beam at CERN (H8 beam line, SPS)

10-24 June 2026: test beam at CERN (T10 beam line, PS)

- hopefully using Alcor64
- still using 1 Gbps IPbus but with optimizations
- the RDO firmware will anyway need some reshuffling

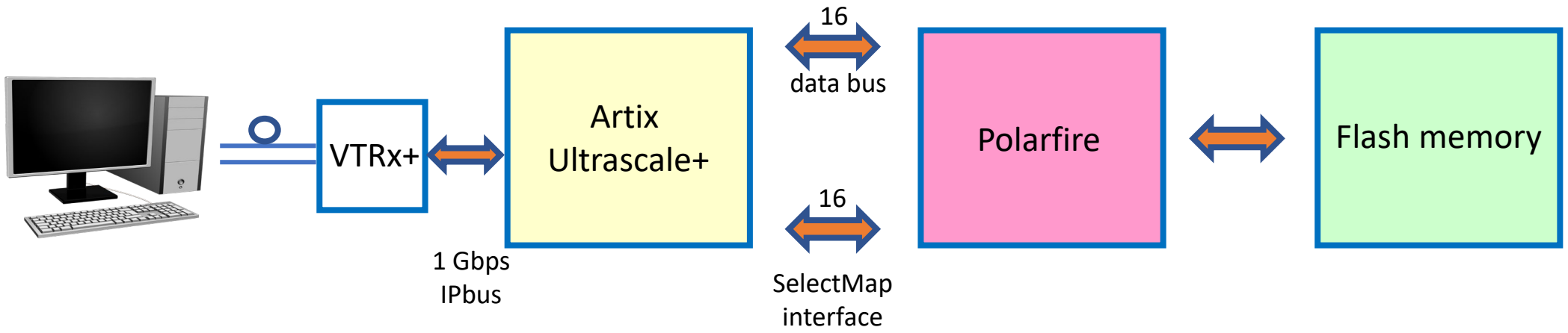
We currently have 8 working RDO boards:

- one will be used at Trento and will not be available for the test beam
- so we are evaluating the possibility to build a few other RDO boards

First goal: XCAU15P irradiation tests

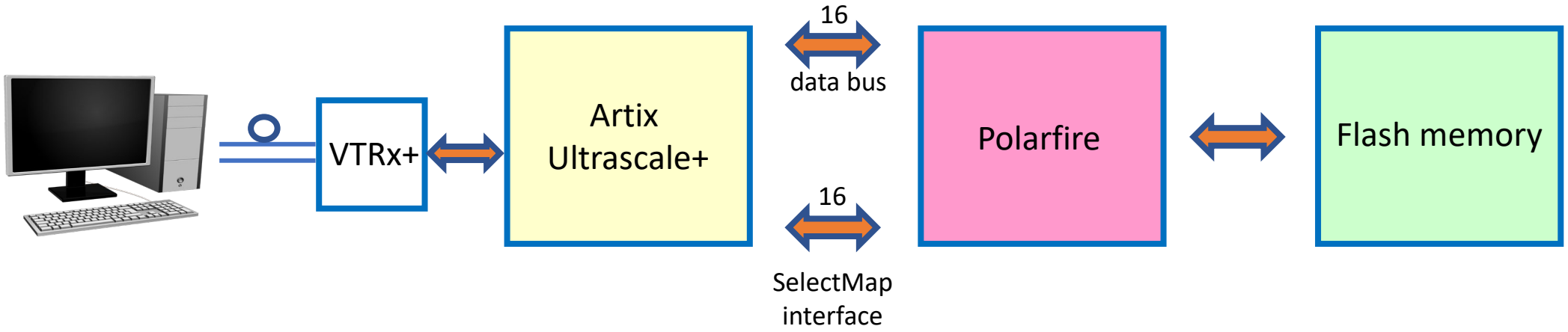
- We are preparing an irradiation test with protons in Trento (Centro di ProtonTerapia) scheduled for:
  - 28 March 2026

- The goal is to irradiate the Artix Ultrascale+ FPGA while the PolarFire FPGA performs the **scrubbing**: we want then estimate how scrubbing improves the SEU cross-section



With scrubbing ON, the Polarfire will read the Flash memory and will then continuously write the frames into the US+ Configuration RAM (**CRAM**) frames

First goal: XCAU15P irradiation tests



Current situation:

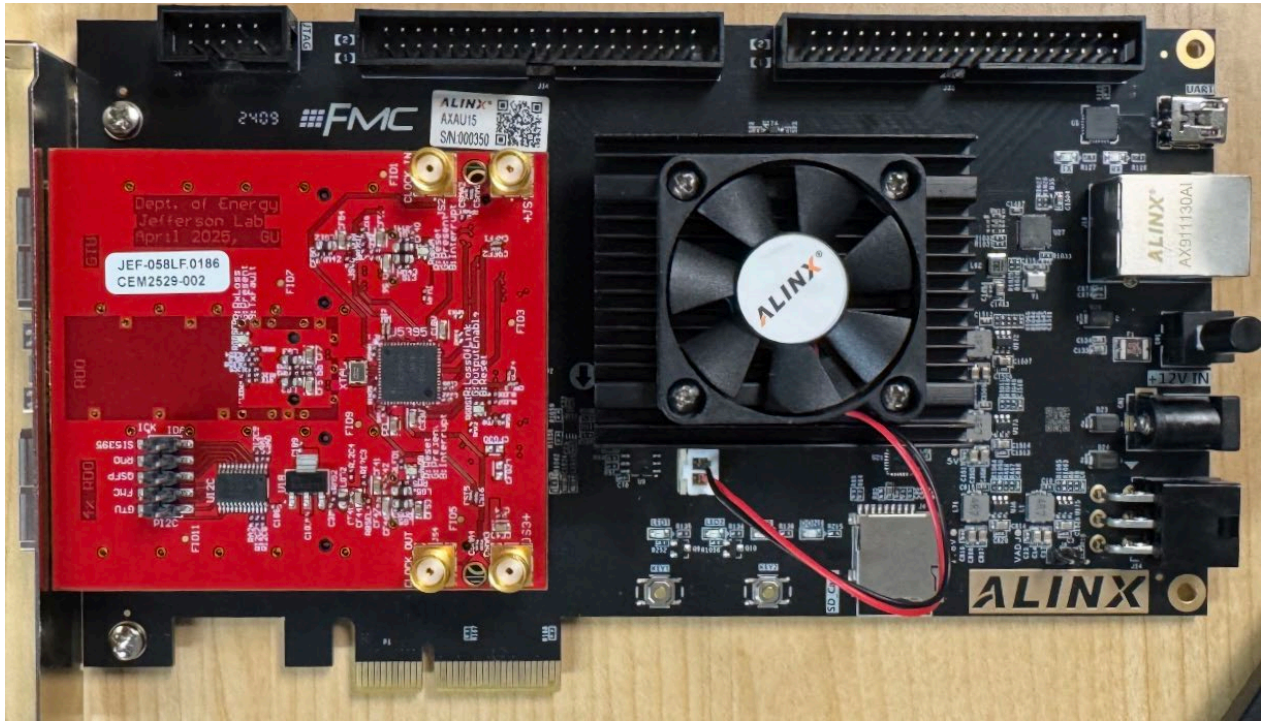
- from the PC, we can access (R/W) the flash memory (using the data bus)
- from the PC, we can access (R/W) the Artix US+ configuration registers inside the CRAM

Now working on:

- accessing (R/W) the Artix US+ configuration RAM frames

Tests with FADE board

We are currently diving into William's firmware for the FADE board:
thanks to his help we are improving our understanding

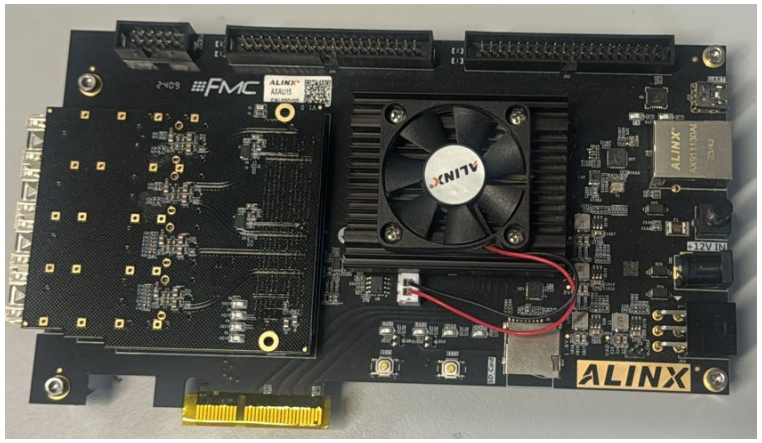


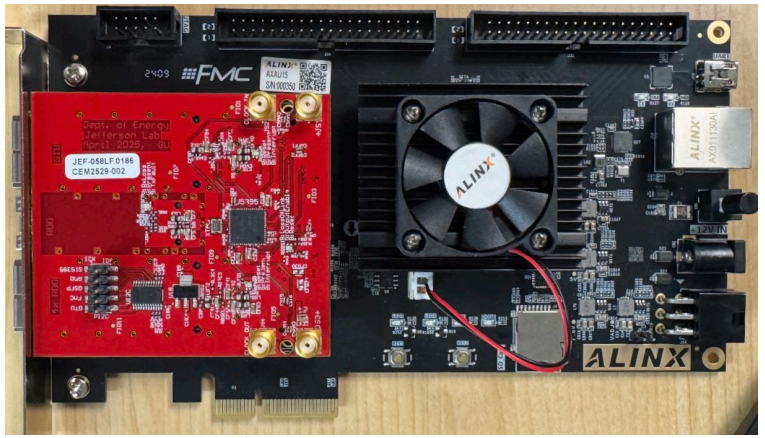
Current situation:

- we tested the Xilinx core IBERT implementing a 10 Gbps optical loopback, which works nicely

Tests with FADE board

Next steps:

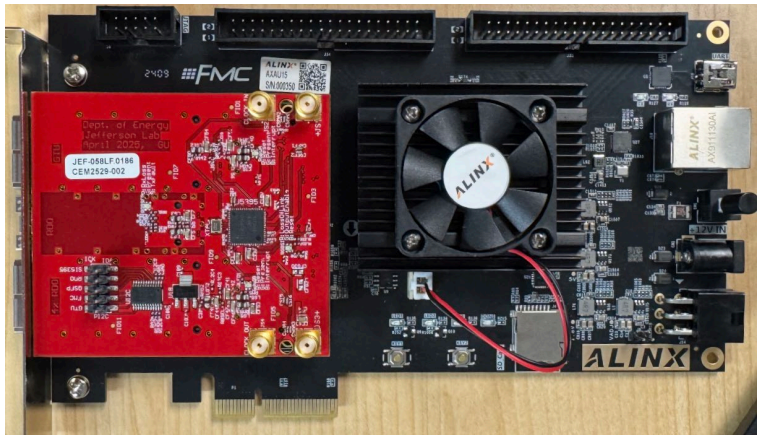




Optical link tests with 2 Alinx boards

RDO

DAM-like



Optical link tests with RDO and one DAM-like Alinx

After these tests, we will begin practicing with the lpGBT – full protocols