

UKRI/STFC – ISIS neutron and muon source

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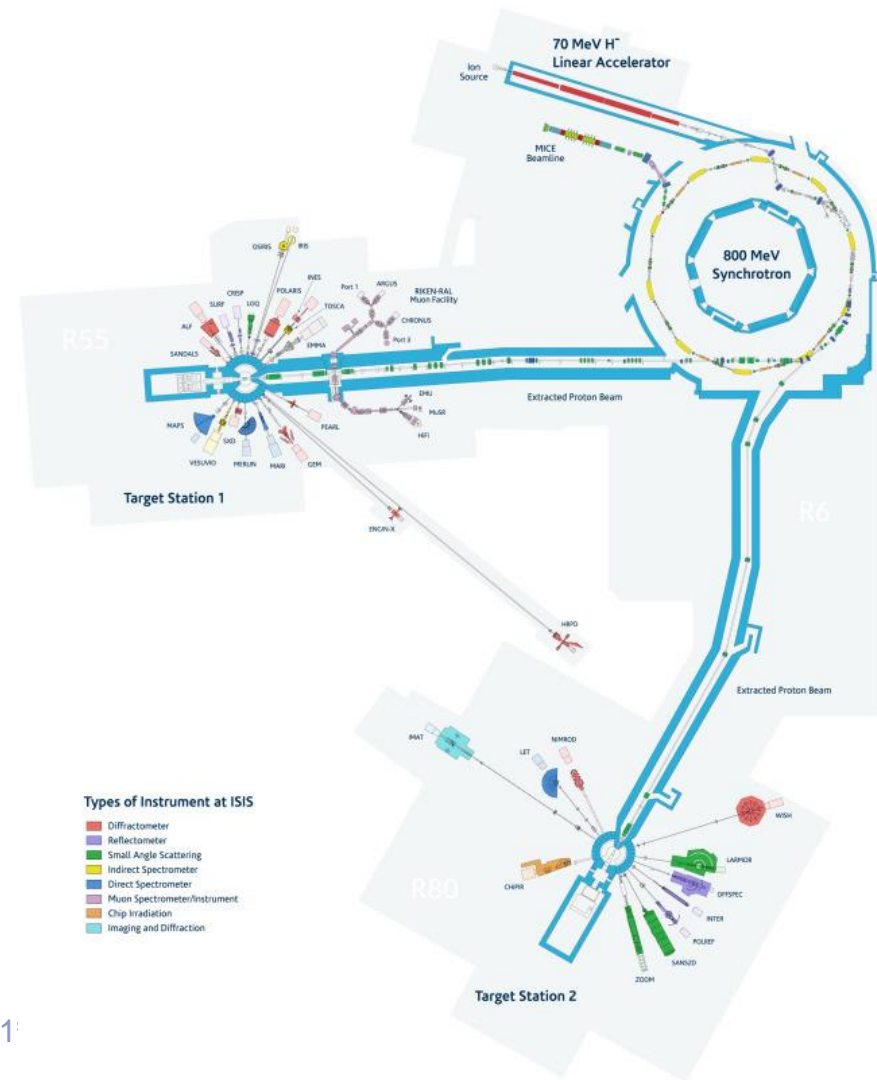
RADNEXT 1st Annual Meeting – 8-9 June 2022

<https://indico.cern.ch/e/radnext-2022>



RADNEXT facilities in ISIS

- A. ChipIR – neutrons
Atmospheric-like spectrum up to 800 MeV
Facility designed for electronics testing
- B. EMMA – thermal neutrons
average energy of $\sim 25\text{meV}$
Shared facility with STFC detector group
- C. RAL-RIKEN - muons
momentum up to $60\text{ MeV}/c$



1. Completed TA campaigns - *Chiplr*

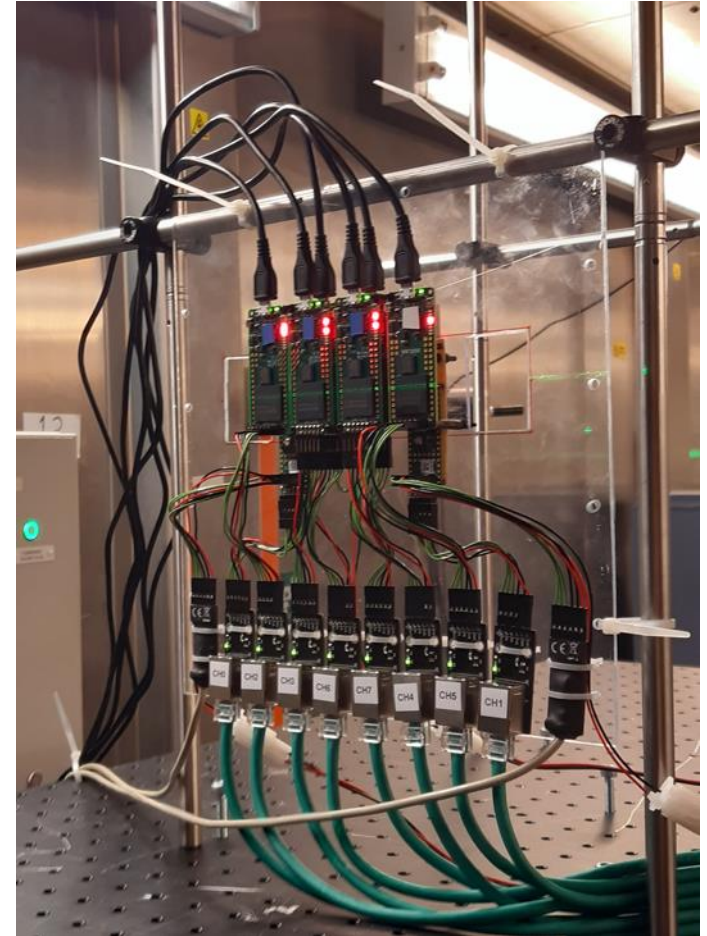
LIRMM

Test Of Systems for Harsh Environment (3 days)

- Characterization of the reliability of soft-core systems implemented in FPGA devices
- Different FPGA technologies used for the characterizations (Flash- and SRAM-based)
 - Fault-tolerant RISC-V System-on-Chip
 - 8-bit 4x4 Network-on-Chip
- Successful campaign



See yesterday's talk from [André Mattos](#)
WP06/JRA2 - Feedback and results from first test campaigns in facilities (PSI and Chiplr)



1. Completed TA campaigns - *Chiplr*

CNES TA03-32

BRAD (Balloon Radiation Analysis Device) Test at Instrument Level (1d)

- BRAD for testing with atmospheric neutrons to prepare for its upcoming flights
- New users of *Chiplr*
- Successful campaign
- MiniPix in “parallel”



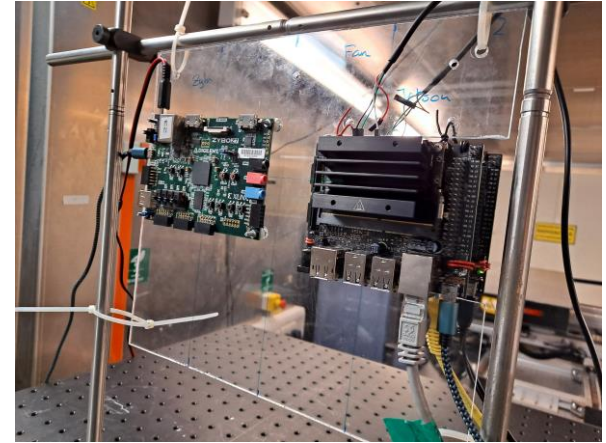
2. Scheduled TA campaigns – *ChipIrr*

UC3M

Test Of Systems for Harsh Environment (2 days)

- Simultaneous test of multiple boards
 - Zybo (Zynq 7000)
 - NVIDIA Jetson Nano GPU
- Different implementation and combination of benchmarks for the Zybo and the NVIDIA
- ✗ Problem with the delivery of the shipped equipment
- ✓ New time slot to be assigned in July/September
- Lessons to be learned (Logistics communication etc)
- ! Opportunity for the new users to get acquainted with the facility

uc3m



See yesterday's talk from [Luis Entrena](#) WP06/JRA2 - Feedback and results from first test campaigns in facilities (PSI and ChipIR)

2. Completed / Scheduled TA campaigns – *EMMA, RAL-RIKEN*

None

(TS1 in long shutdown, commissioning in September)

3. Accepted and assigned TA campaigns, to be scheduled

– RAL-RIKEN

Vanderbilt School of Engineering TA03-30

Characterization of muon-induced SE Effects at the 5-nm Node (5d)

Aim:

- SEU characterization for a wide range of FF designs from the industry, single-port SRAM and two-port SRAM as a function of muon momentum and supply voltage
- Scaling trends across technologies with consistent test methods
- Predictive models to meet specifications through design



VANDERBILT

School of Engineering



3. Accepted and assigned TA campaigns, to be scheduled

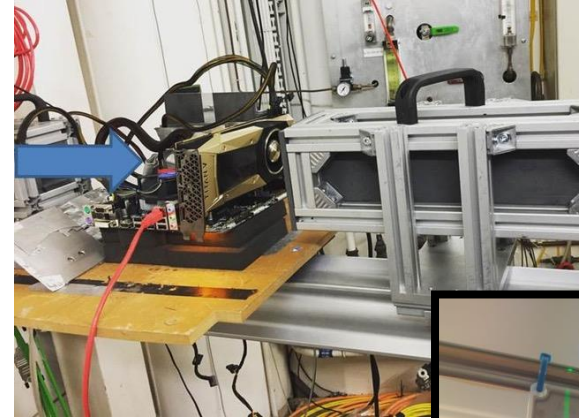
– EMMA

Università di Trento, TA04-48

Thermal Neutrons Effects on CNN Executions (6d)

Aim:

- If Boron-10 is present thermal neutrons can generate faults.
- EMMA tests of GPUs, TPUs, Raspberry Pi 4
- Measure the sensitivity to thermals of COTS devices running neural networks
 - Understand the criticality of faults (how many misdetections?)
 - Compare thermal and high-energy neutrons-induced error rate (ChipIR)
 - Predict the error rate of COTS accelerators in specific scenarios (rainy day, close to water, etc...)



4. TA time already awarded VS Total facility TA quota

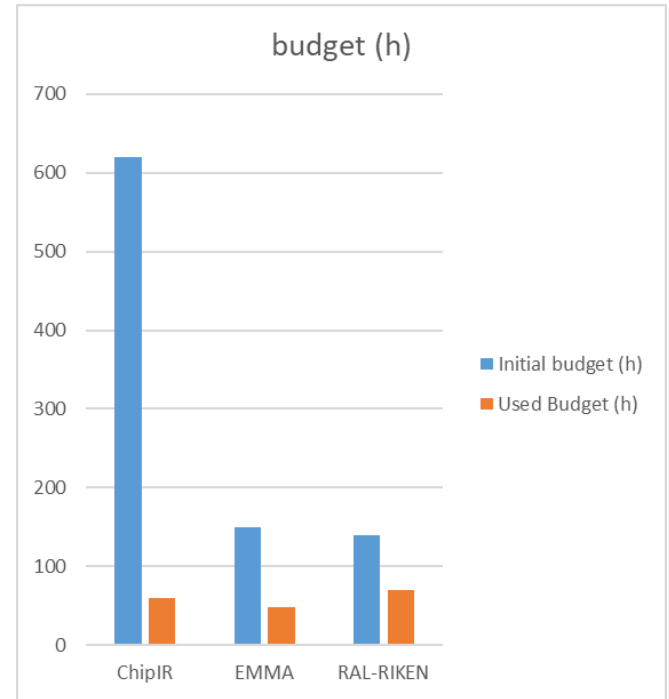
Including delivered, scheduled and accepted:

Chiplr 60/620≈10%

EMMA 48/150 =32%

RAL-RIKEN 70/140=50%

- ISIS was in long shutdown
 - TS2 for 9 months, delivered time only for May beam cycle in Chiplr (TS2)
 - TS1 will be back after September 2022



5. Approach for user (financial) support

- Financial support was not requested (up to now) from users
- Reimbursement of expenses is possible
→ collection of receipts is required (STFC policy)
- In some cases the financial support for their expenses was not clearly communicated to the users



6. Overall feedback about TA workflow

- Up to today, 100% academic users
 - Smooth collaboration with the ISIS User Office, instant approval of the RADNEXT reviewed proposals
 - Users contact one of the Chiplr team to assign beam dates
 - Automatic email informs users of the rest of the procedures to be followed (safety training, Experimental Risk Assessments, accomodation)
- Logistics issues have been observed as a post-COVID and Brexit combination, users are strongly advised to ship well in advance and keep a frequent communication with the courier companies, the local contacts (Carlo, Maria, Chris) and STFC logistics.

Thanks for your attention!

Image Source: RADSAGA

