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New digitisers project: iThemba-STFC collaboration

Philippos Papadakis
Mos Kogimtzis

NP Community Meeting, January 2026

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DASSIE – Digital Acquisition Signal System for Innovative Experimentation

- A project to develop a low-power, light-weight, “low-cost”, streaming digitiser
- ~£700k funding from ISPF-RIPP, Dec ‘24 – Mar ‘27

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National Research Foundation
iThemba LABS
Laboratory for Accelerator Based Sciences

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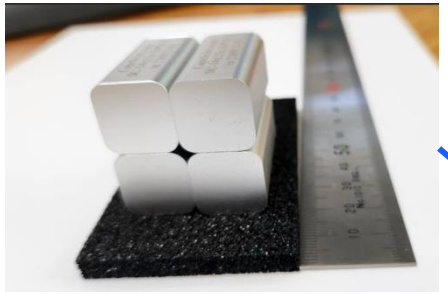

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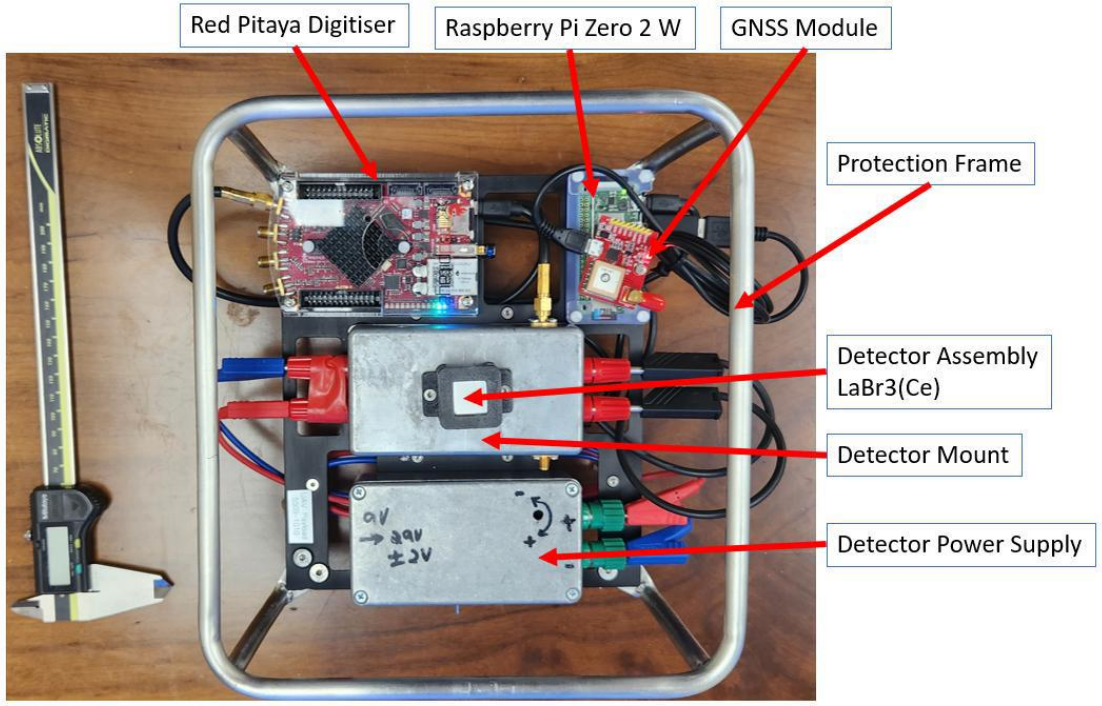

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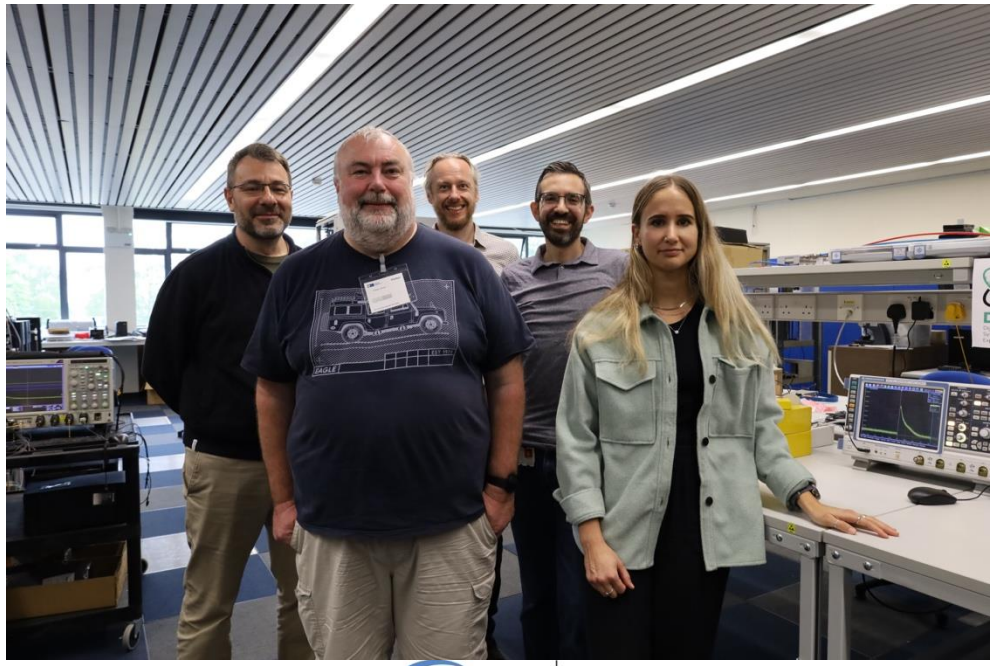

- Building on existing projects from iThemba LABS
- Support for scientists and engineers to travel to DL and iThemba

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NRF National Research Foundation | iThemba LABS Laboratory for Accelerator Based Sciences

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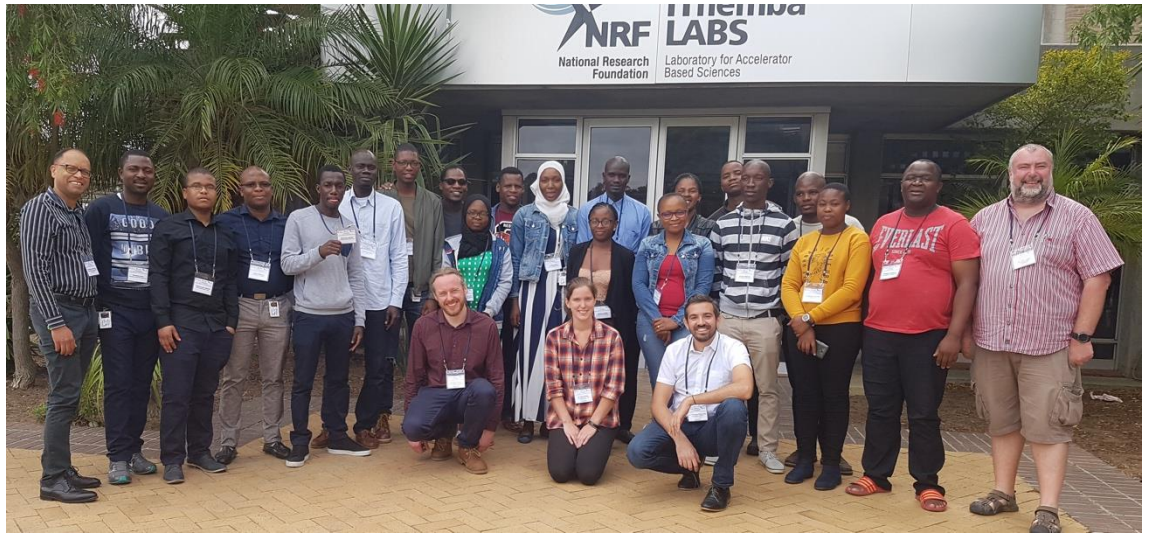
ANSTT5

- Building on existing projects from iThemba LABS
- Support for scientists and engineers to travel to DL and iThemba
- Deliver workshops at iThemba



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SPAMS

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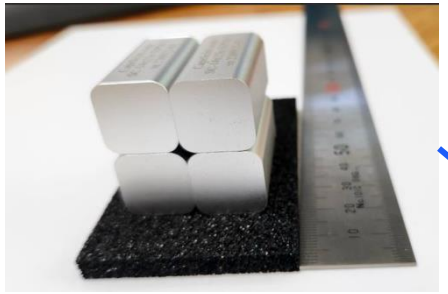

- Building on existing projects from iThemba LABS
- Support for scientists and engineers to travel to DL and iThemba
- Deliver training workshops at iThemba
- Collaboration with Hartree Centre to develop real-time AI analysis tools
- Collaboration with UK-ATC to develop web-based data analysis tools

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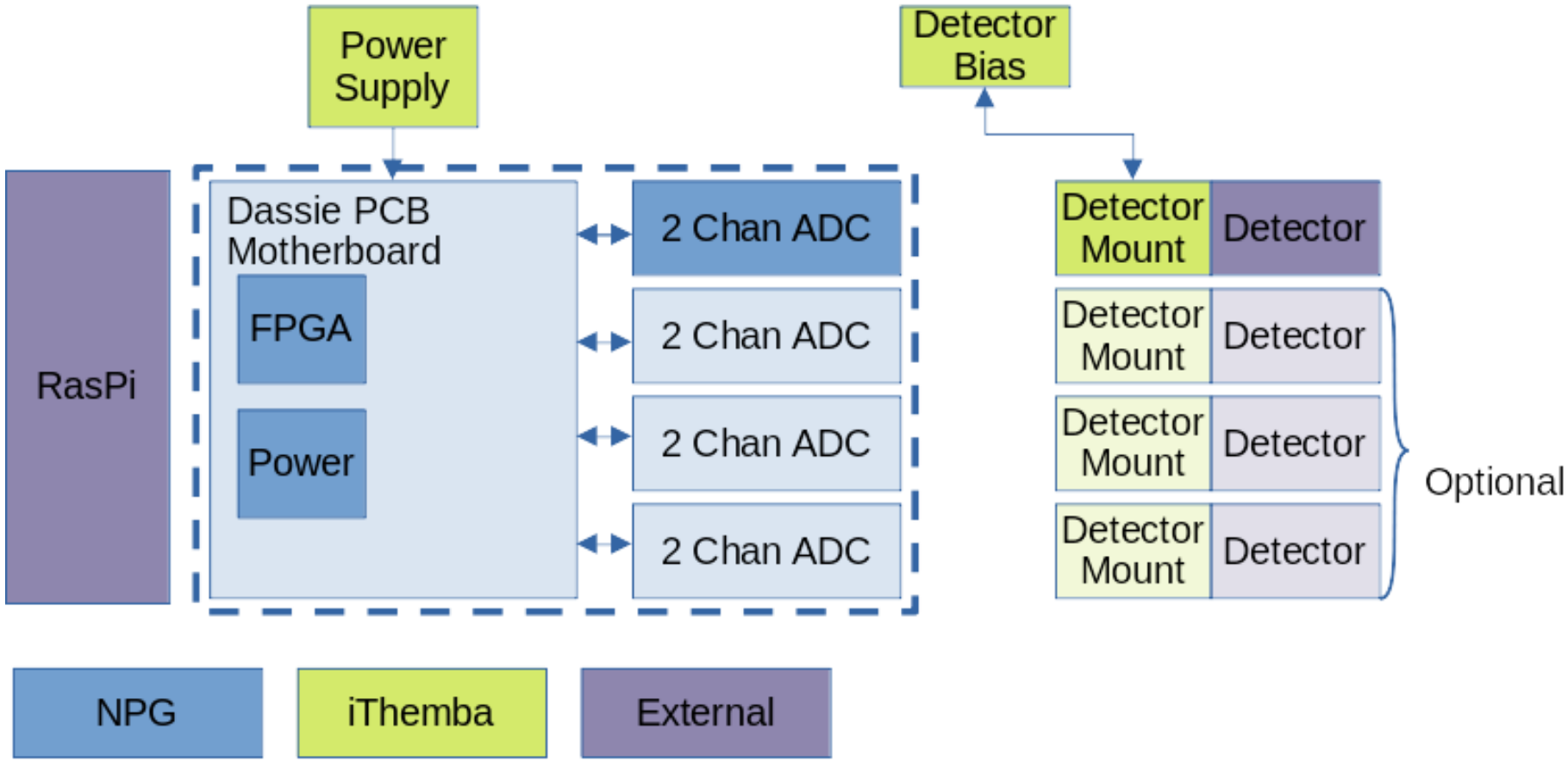
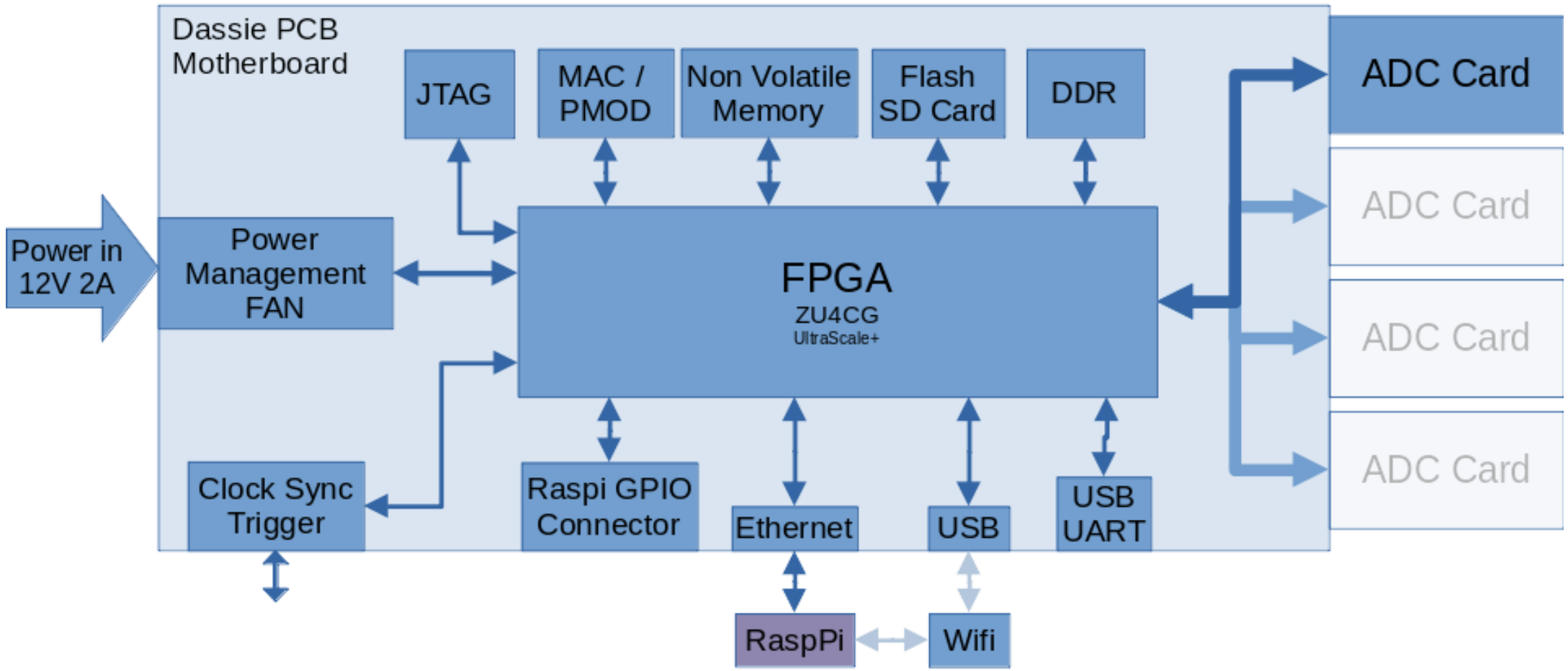
Dassie Block Diagram



Dassie FGPA PCB



Dassie Block Diagram v0.5 19 Mar 2025

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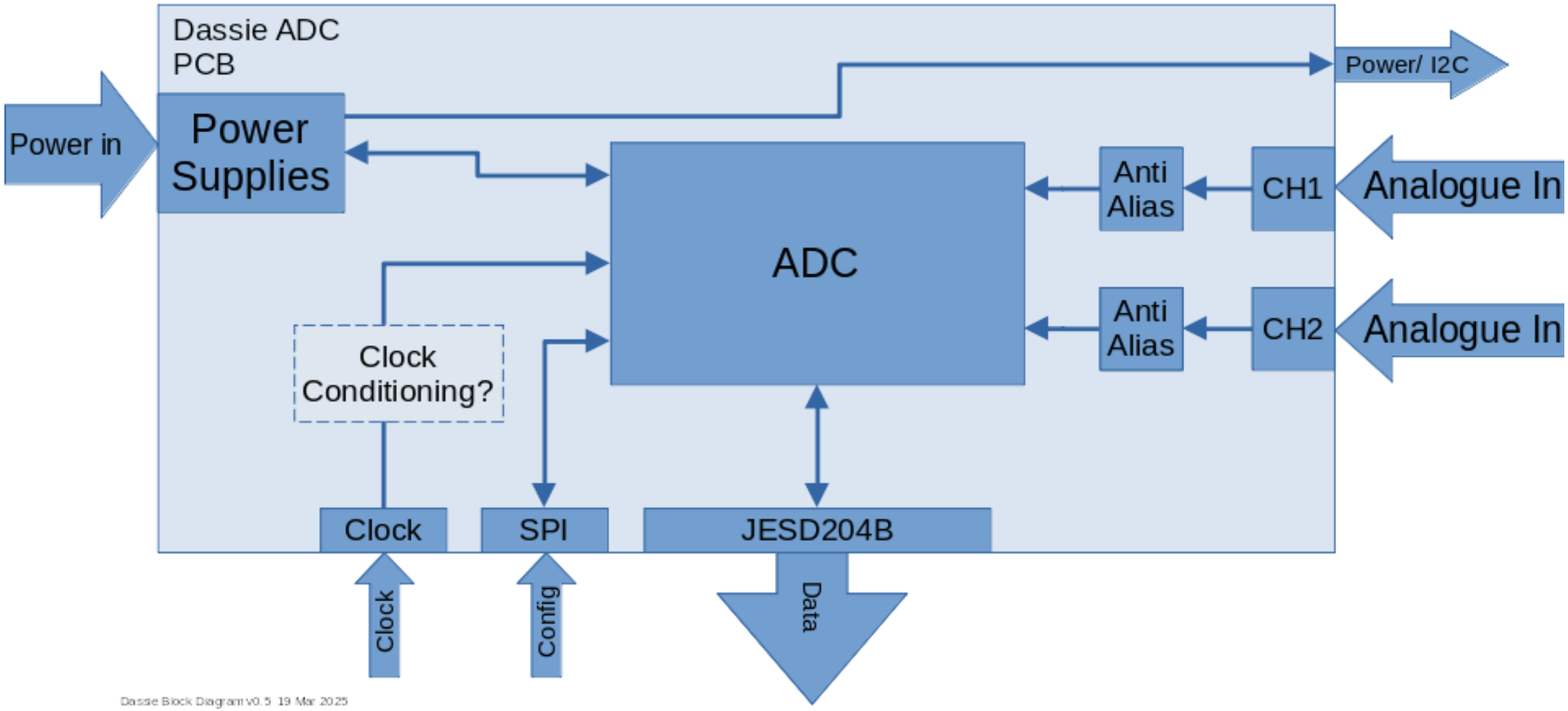
Dassie ADC PCB



Dassie Block Diagram v0.5 19 Mar 2025

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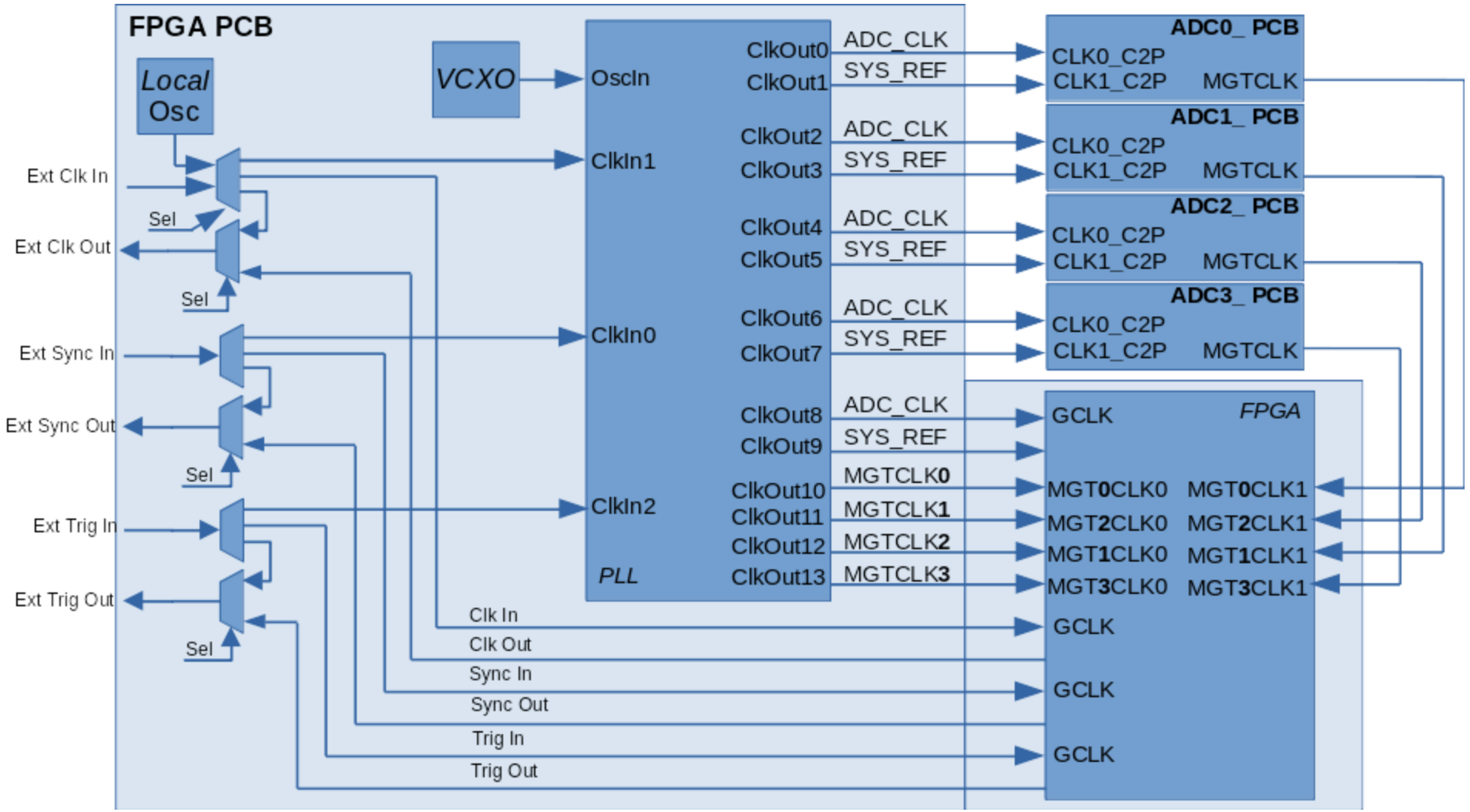
Dassie Clk/Sync/Trig



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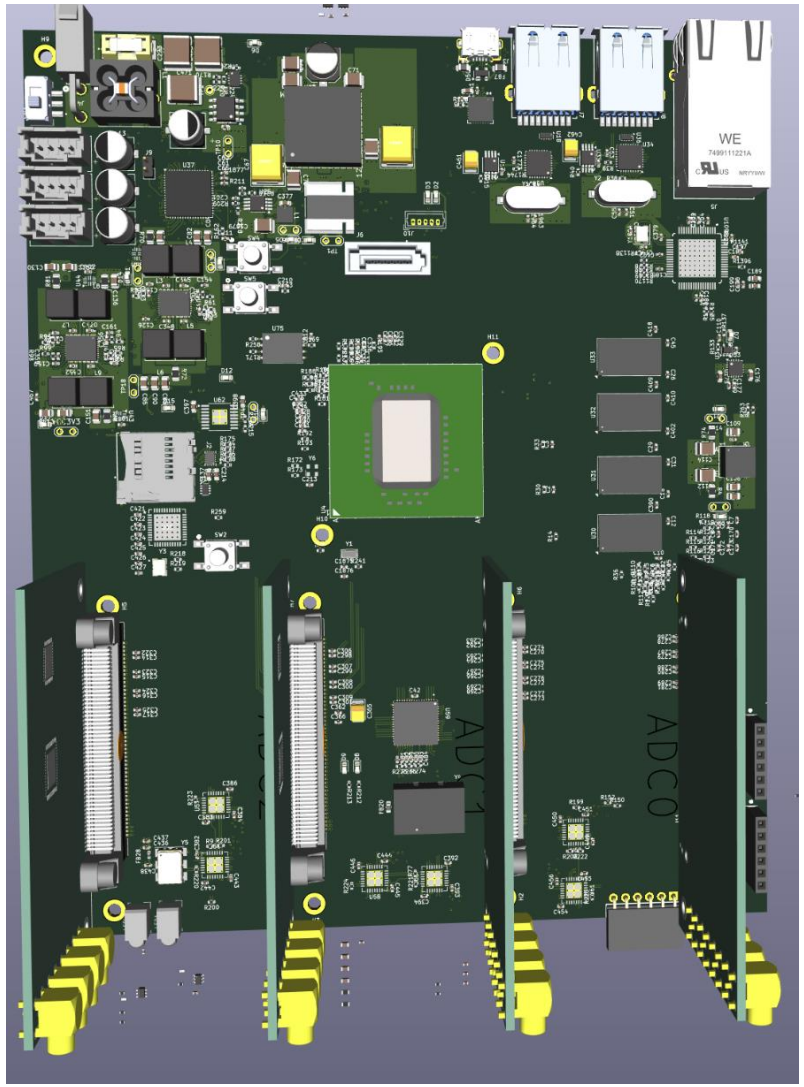

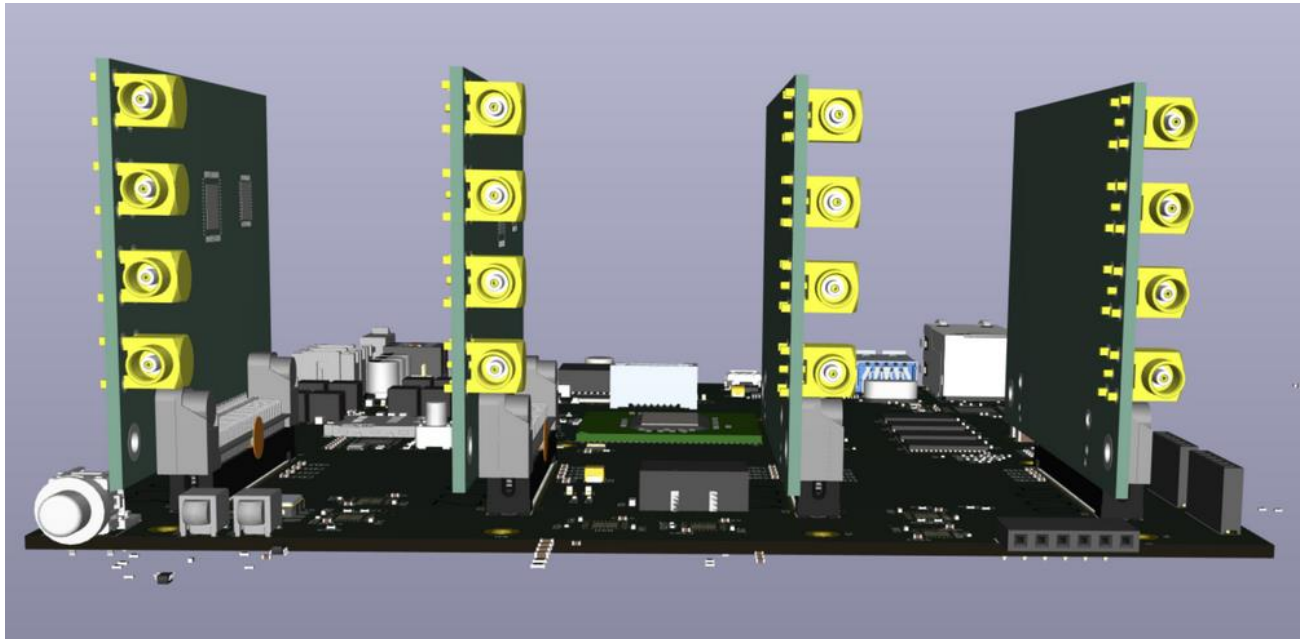

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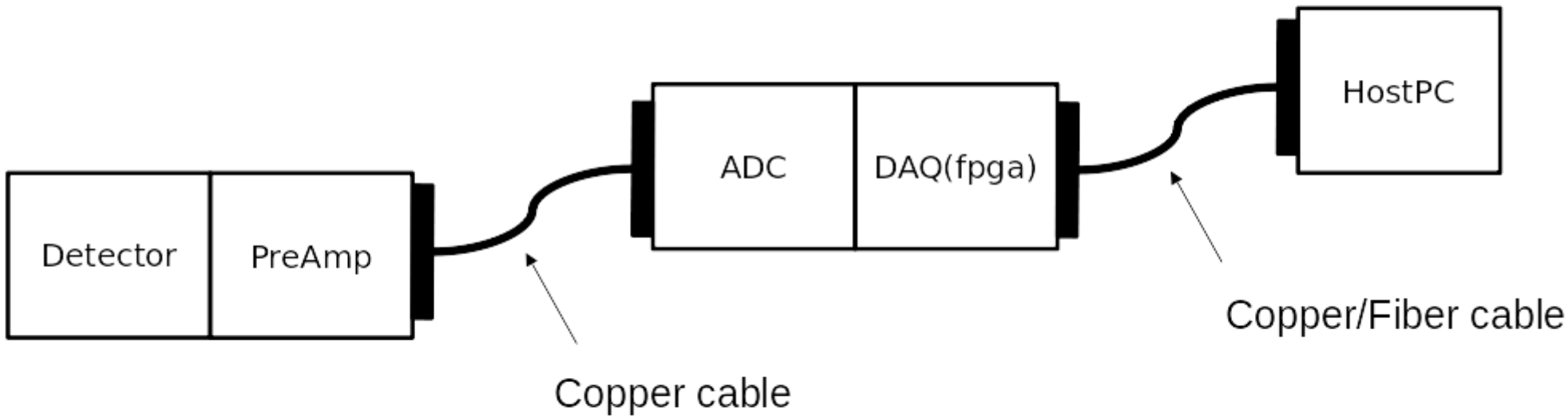
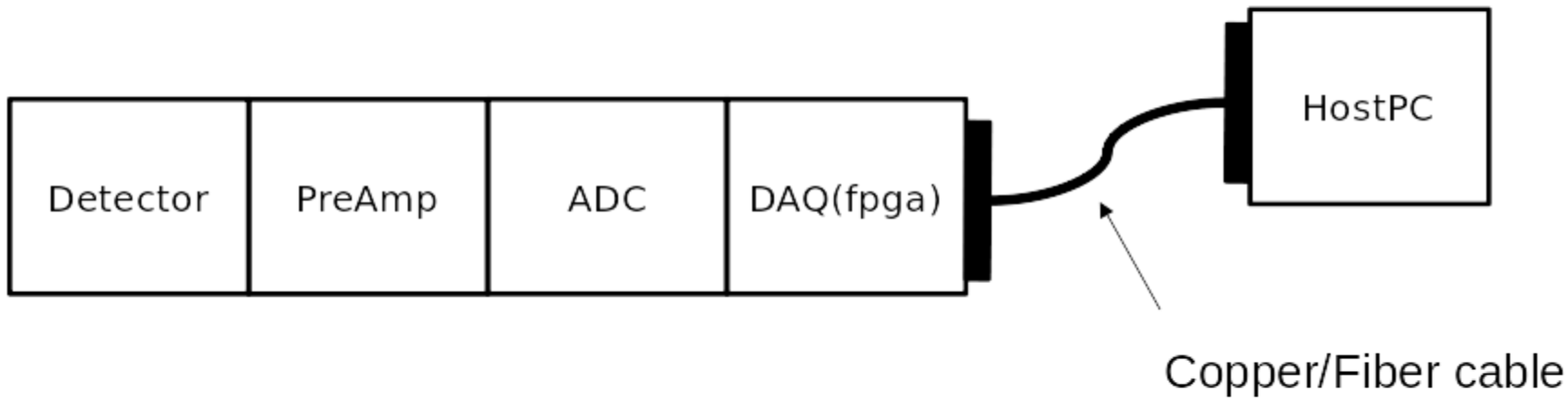
System Topology 1



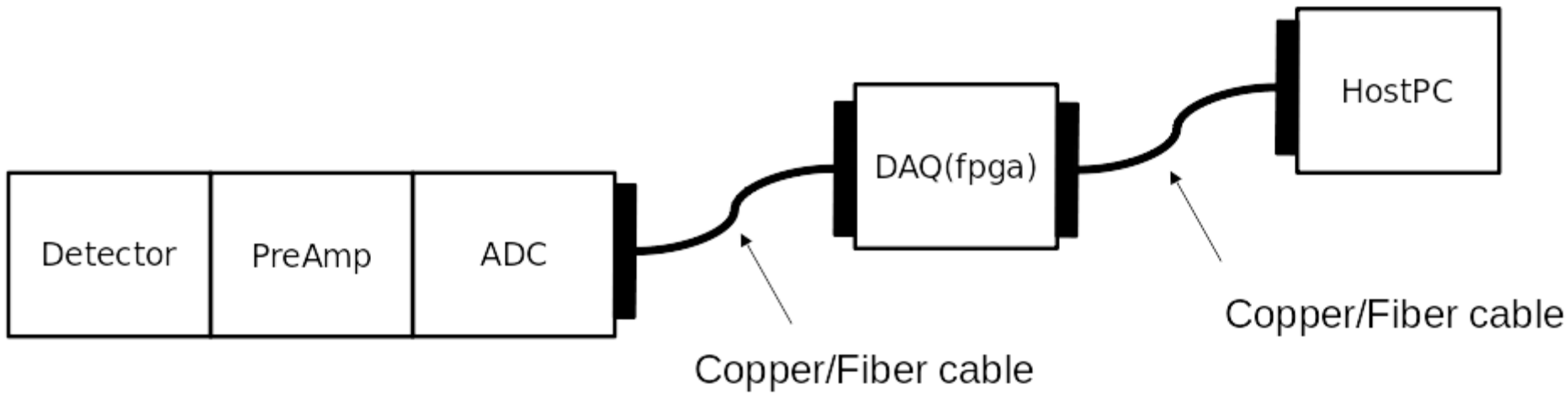
- Cables b/w PreAmp and ADC are copper, so prone to attenuation, noise pick up and introducing ground loops.

System Topology 2



- Moving the ADC and DAQ close to the detector/PreAmp minimises the above issues, but introduces more power dissipation at the detector/PreAmp side.

System Topology 3



- By placing only the ADC at the back of the PreAmps and using fiber cabling to transfer the data, achieves a good balance b/w introducing extra power at the detector preamp side and minimise noise and ground loops.

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Thank you