MT ARD

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HZB Helmholtz Zentrum Berlin

ADAPTIVE FEEDFORWARD CONTROL OF SUPERCONDUCTING RESONATORS ON RFSOC

A. Ushakov, A. Neumann, N. Shipman

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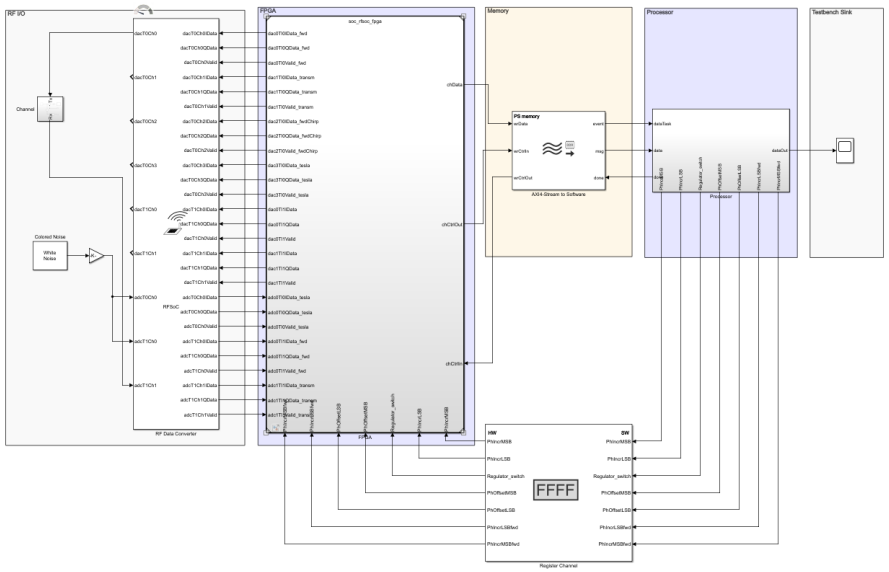
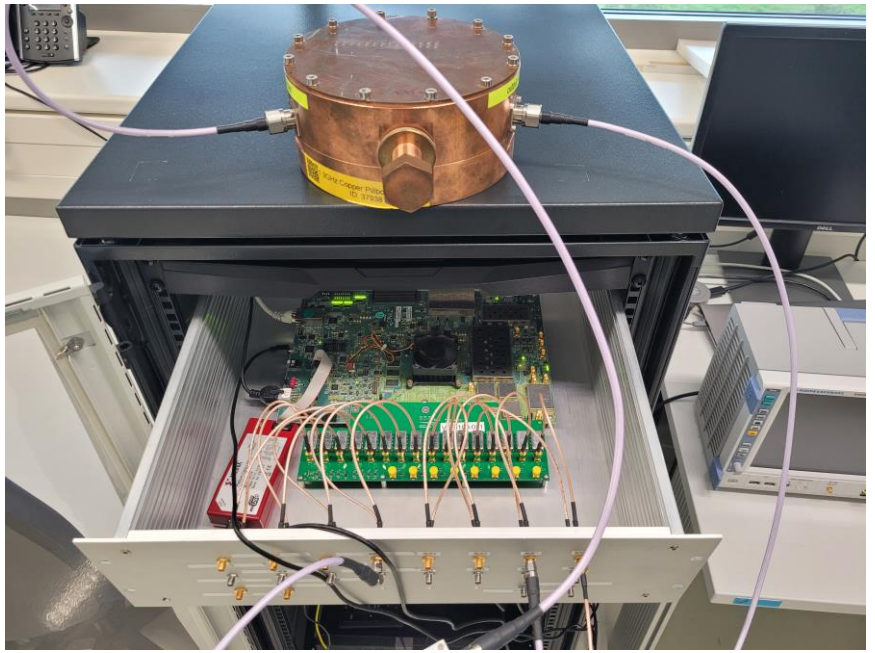
RFSoC laboratory bench for debugging control algorithms

- mTCA is widely used as control hardware for accelerators in HZB
- RFSoC advantages:
  - adjustable PLL
  - ADC/DAC (mixing, Nyquist zone and bandwidth tuning)
  - Support for DSP algorithms by design tools
- The developed setup is based on Xilinx ZCU111 RFSoC
- This allows to develop :
  - Fully digital PLL on RFSoC
  - Self-excited loop for FRT control
  - TESLA RF simulator

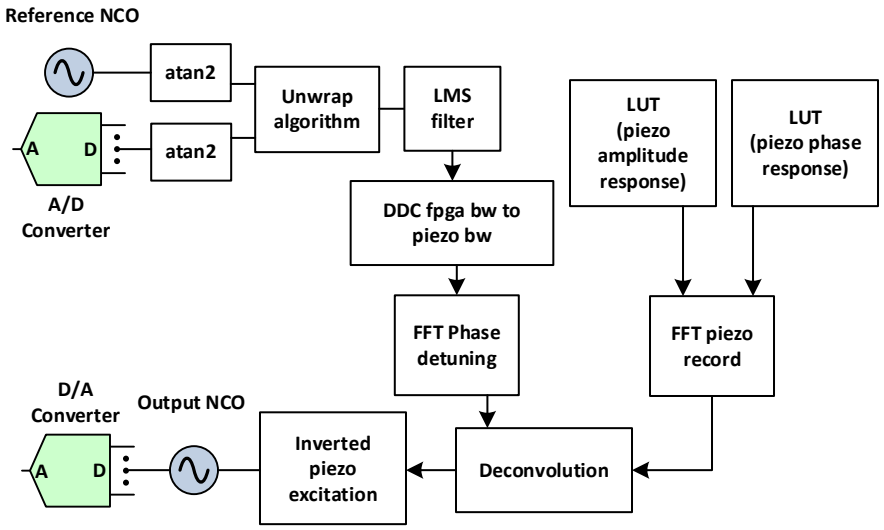
SW/FW development environment



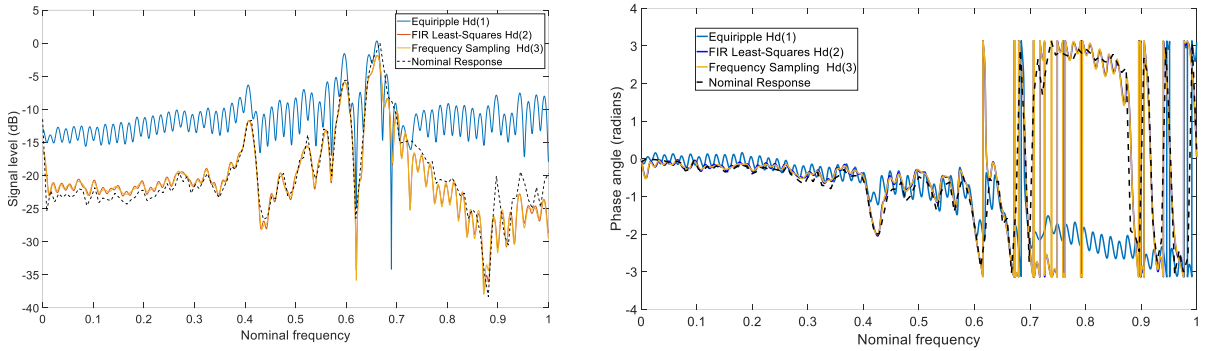
Hardware implementation



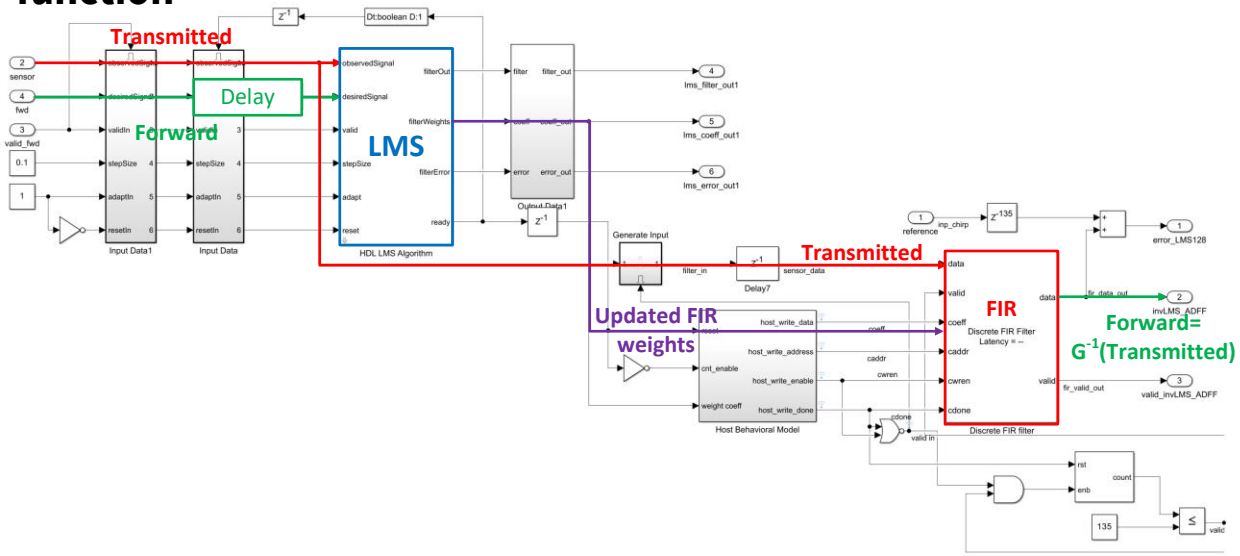
Initial idea for adaptive feed-forward control



Description of object behavior by a finite filter based on the transfer function



Feed-forward control based on the inverse transfer function



Adaptive feed-forward piezo element control scheme