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Controller latency improvements at REGAE

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REGAE is a facility for UED experiments (ultrafast electron diffraction) based on a normal conducting S-band gun and buncher cavity. Their RF regulation is performed by a single cavity controller, implemented by an FPGA firmware and operating at 125 MHz. With a variant of the Struck SIS8300-KU controller board that is equipped with 250 MSps ADCs we were able to increase the frequency of the complete digital processing chain to 250 MHz. This includes the ADCs, field detection, feedback controller and DAC. Doubling the frequency reduced the overall controller latency by almost a factor of two. In the poster we show which firmware components had to be optimized or rewritten to achieve the 250 MHz clock rate.

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