Developments in xTCA for the SLAC National Accelerator Laboratory*

R. Larsen[1], C, Adolphsen[1], D. Brown[1], R. Downing[2], Z. Geng[1], G. Haller[1], T. Himel[1], M. Huffer[1], E. Medvedko[1], T. Straumann[1], L. Piccoli[1], D. van Winkle[1], E. Williams[1], C. Xu[1], C. Yee[1], A. Young[1]

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Accelerator Requirements

Economical sparse low BW to dense high BW, throughput applications.   Precise synchronization clock, timing, triggering extensions   High availability redundancy options   Rear Transition IO Cable Entry   Hot Swap capable   Economical   Scalable from sparse to dense packaging   COTS available

Detector System Requirements

Standard form factor, RTM interface MP Processor apps   High power, cooling options   Precise synchronization clock, timing distribution via extended options region   Scalable range form factors, adapters Radiation resistant electronics, power converters for buried applications

Generic AMC – Custom RTM Concept

MTCA.4 opens options for single-design AMC modules to be leveraged to many applications Generic AMC examples::   Fast ADC-DAC multichannel AMC, RF, BPM, Toroid RTM for signal conditioning, calibration   FPGA AMC Processor for RF Interlock, Photodiode, Camera RTMs Industry Pack Adapter AMC to IO protection RTM for slow control, monitoring   PMC AMC Adapter to interface RTM, many applications

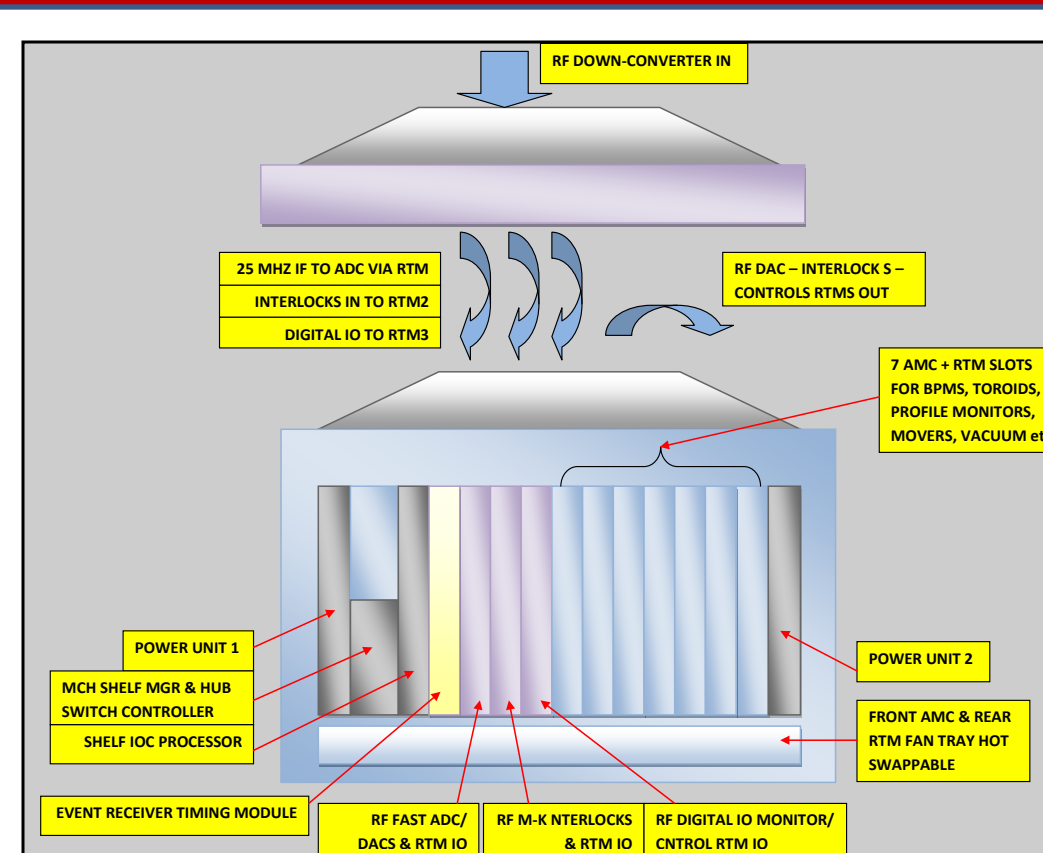## Machine RF Phase Control to Femtosec Stability FPGA Based
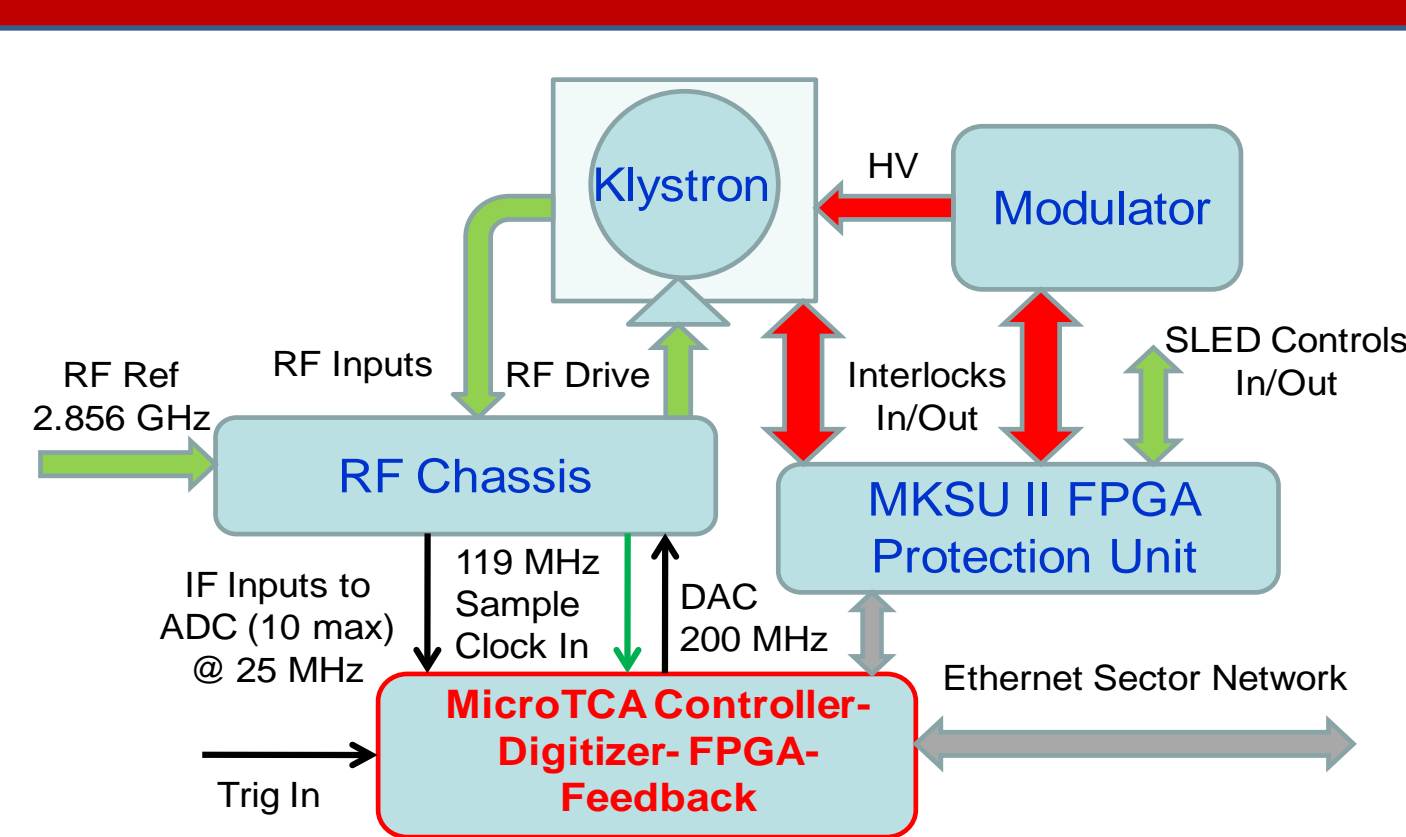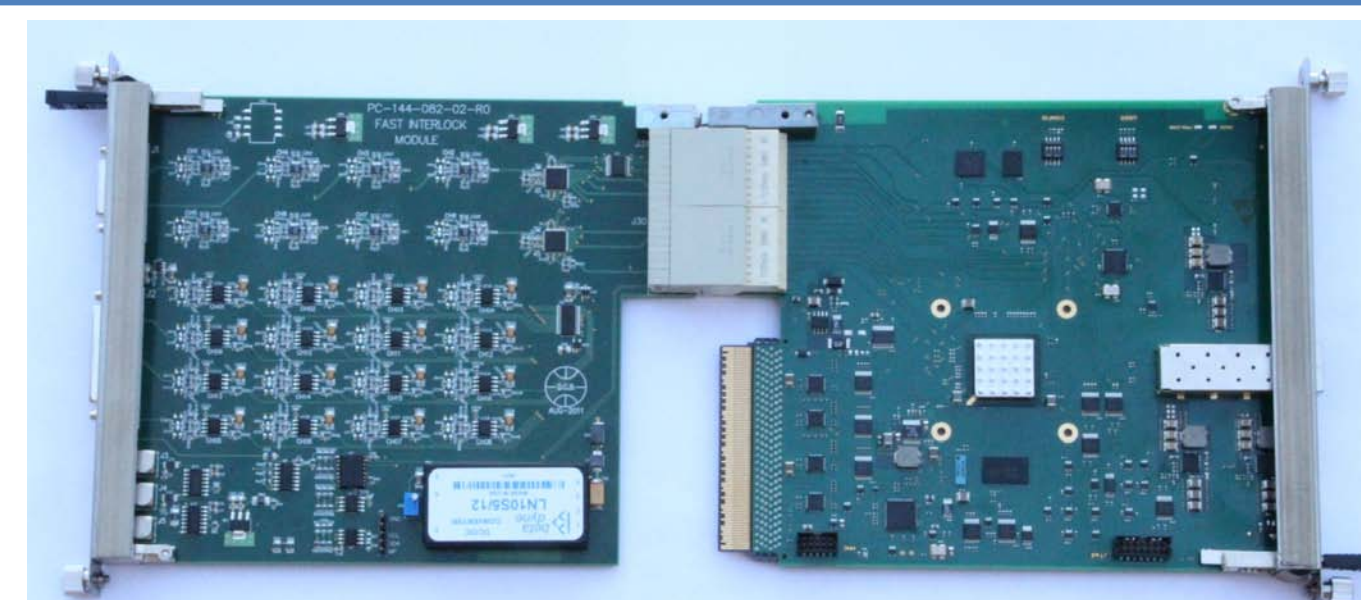

RF Power System w/ MTCA.4 Shelf
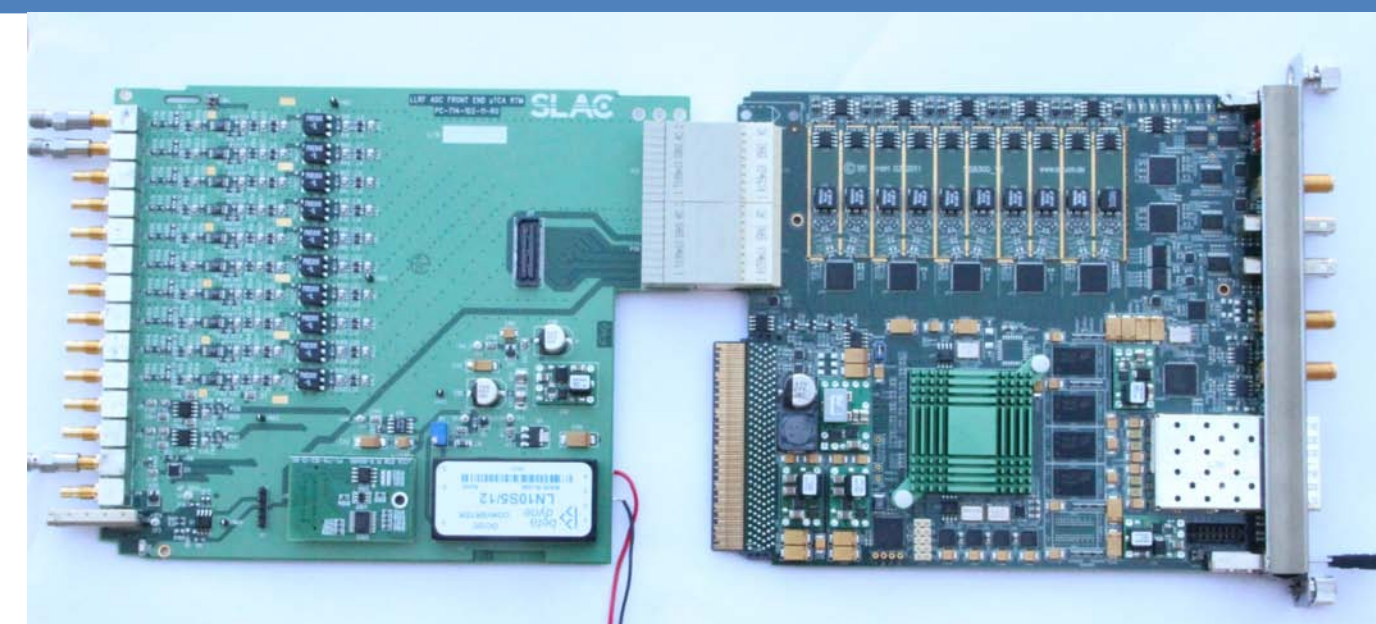
RTM Interface (SLAC) ADC-DAC (Struck)

Courtesy A. Young, Z. Geng, SLAC & Struck Co.

RF Power System Interlocks FPGA Based
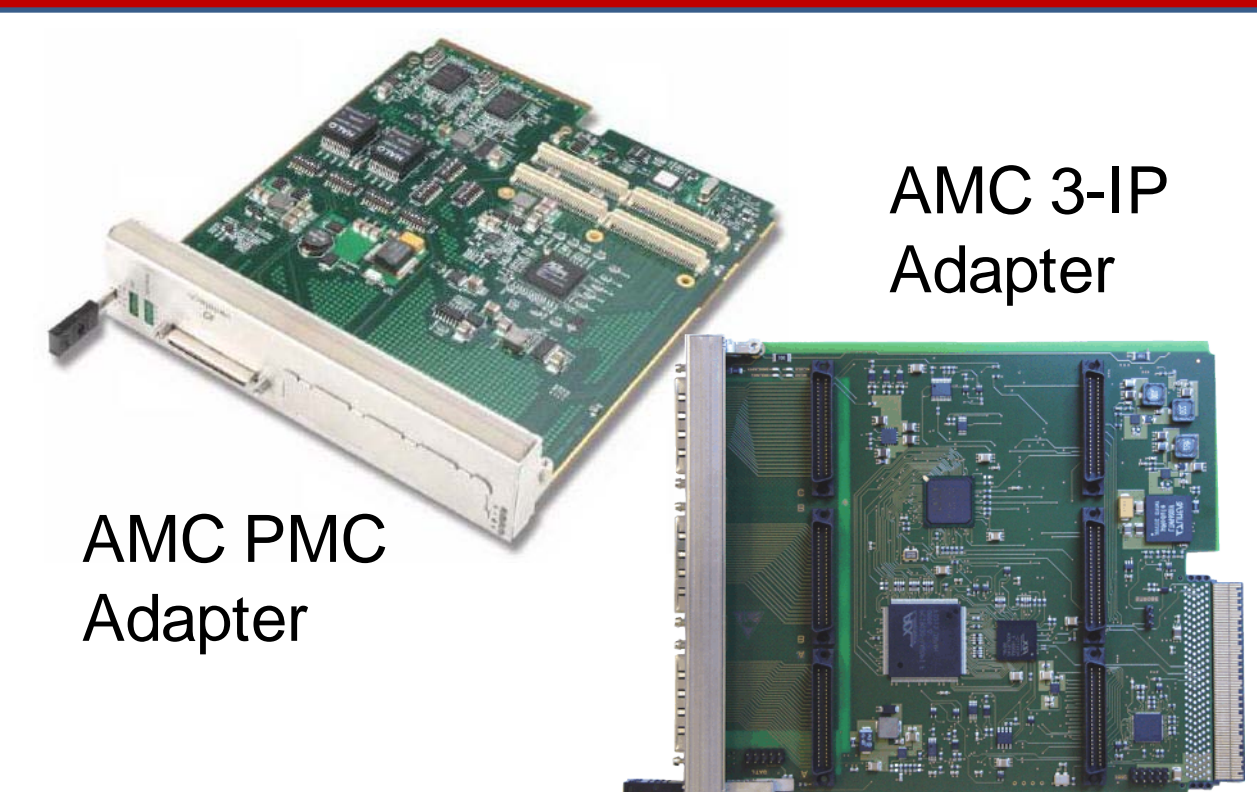

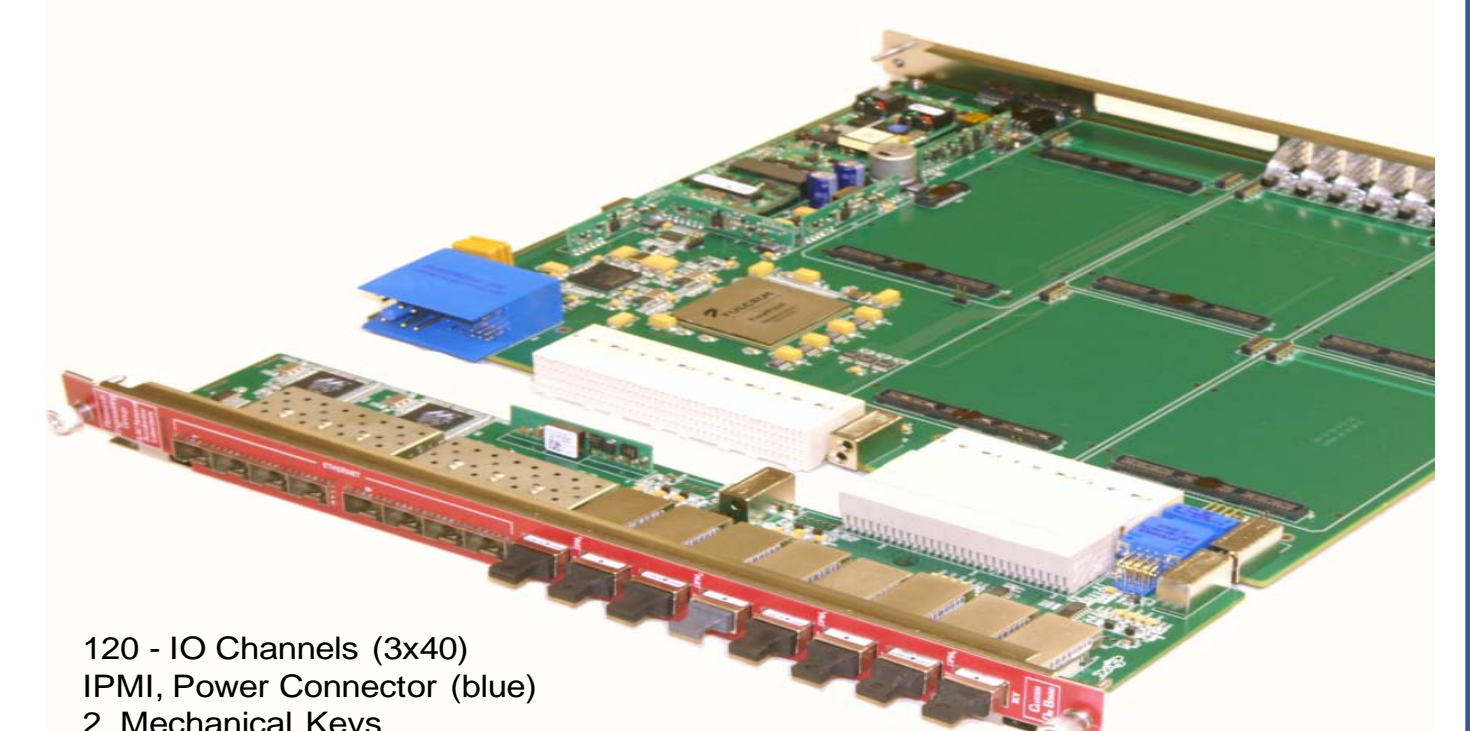### MTCA.4 Control Node Complete RF, Intlks, Cntrls

RTM Fast-Slow ADCs (SLAC) ADC-DAC (TEWS)

Courtesy D. Brown & TEWS Co.

MTCA Adapters, ATCA Massively Parallel Processor

AMC 3-IP Adapter

AMC PMC Adapter

PMC, 3-IP Adapters* *MTCA.0 Versions

120 - IO Channels (3x40)
IPMI, Power Connector (blue)
2 Mechanical Keys

Courtesy M. Huffer, SLAC

First PICMG3.8 Implementation (SLAC)

Courtesy Vadatech, TEWS, M.Huffer.