

Electronics Standard Platform
R&D Plans
2008-10

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Summary

- **Basic Investigations**
 - *Operation ATCA platform started 2006 with University of Illinois (UIUC)*
 - *16-slot and 5-slot shelves; dual controllers and hub switches, single shelf managers*
 - *Successfully demonstrated auto-failover of controllers/ links*
 - *Ran error tests on shelf managers*
 - *Designed first schematic of VME to ATCA Adapter*
 - **Enable further evaluations in actual test systems using off-the-shelf VME modules**

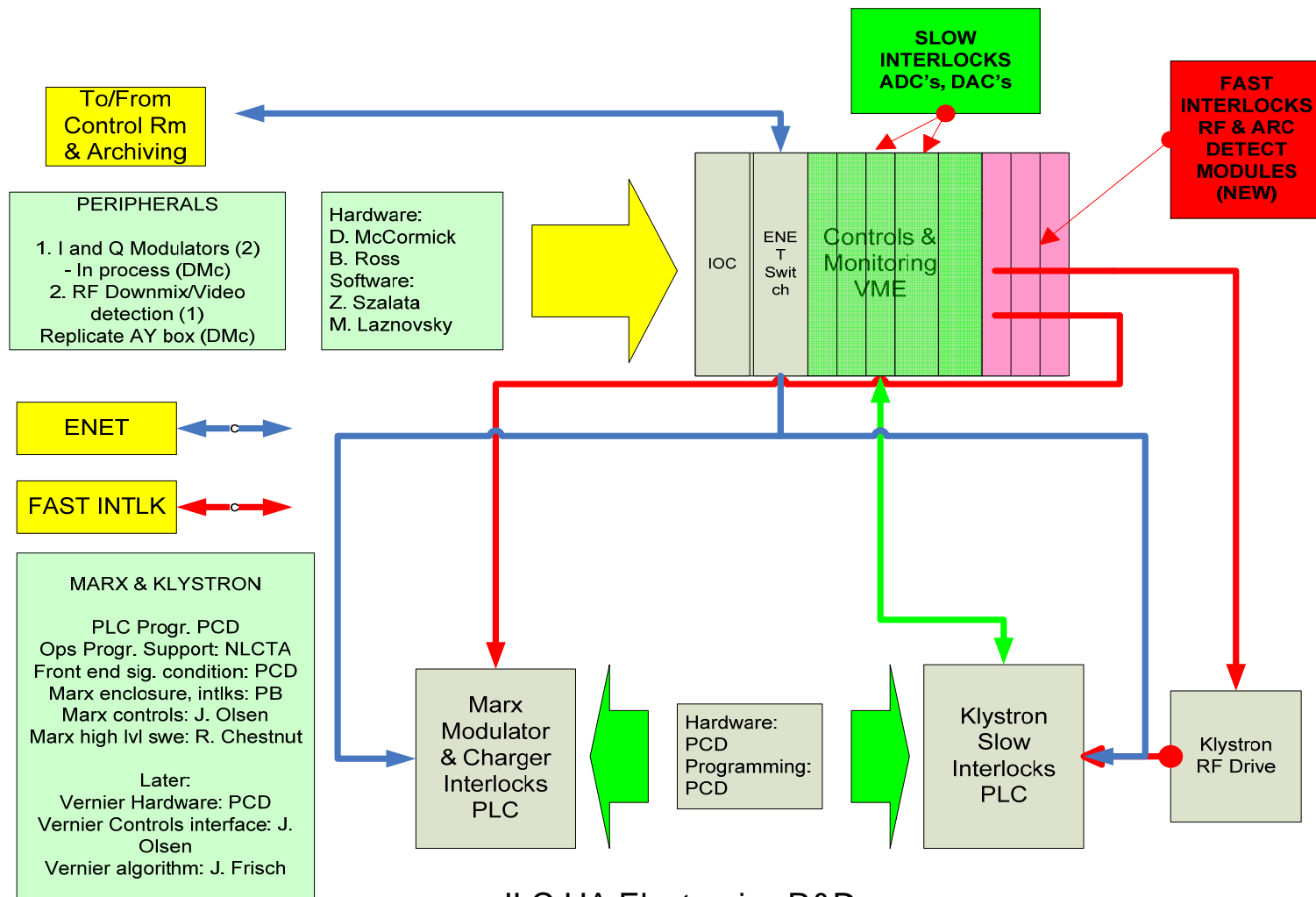
Test Application

- RF Klystron Test Station Interlocks
 - SLAC building test stations for 10 MW klystrons, power distribution system and cavity input couplers
 - Plan: Transition interlock design from initial VME design to ATCA platform
 - Phase I (2008): RF Station 1
 - Implement slow interlocks on standard COTS VME; Fast/Slow RF interlocks on new VME module, FPGA & EPICS based
 - When Adapter complete early CY08, test a new F/S module on ATCA shelf
 - Phase II (2008-9):
 - Cable slow interlocks into new modules as a test; can eliminate VME ADC-DACs
 - Phase III (2009-10): RF Station 2
 - Port F/S design to ATCA module; build modules
 - Design all-rear interconnects to enable module hot-swap
 - Install in 8-slot ATCA shelf (4 Interlocks, dual Controllers and Hubs)
 - Transition software, firmware; test system

VME to ATCA Adapter

- **Adapter and Demo System**
 - *Adapter will enable testing of standard VME modules on ATCA platform*
 - *Can be used for quickly configuring lab bench, beamline test stations etc.*
 - *Contract underway with SAIC to design-build-test 3 adapters*
 - *Deliver Q1 CY08 with RT test software running on test station*
 - *Will test with new BPM module, interlock module in progress*

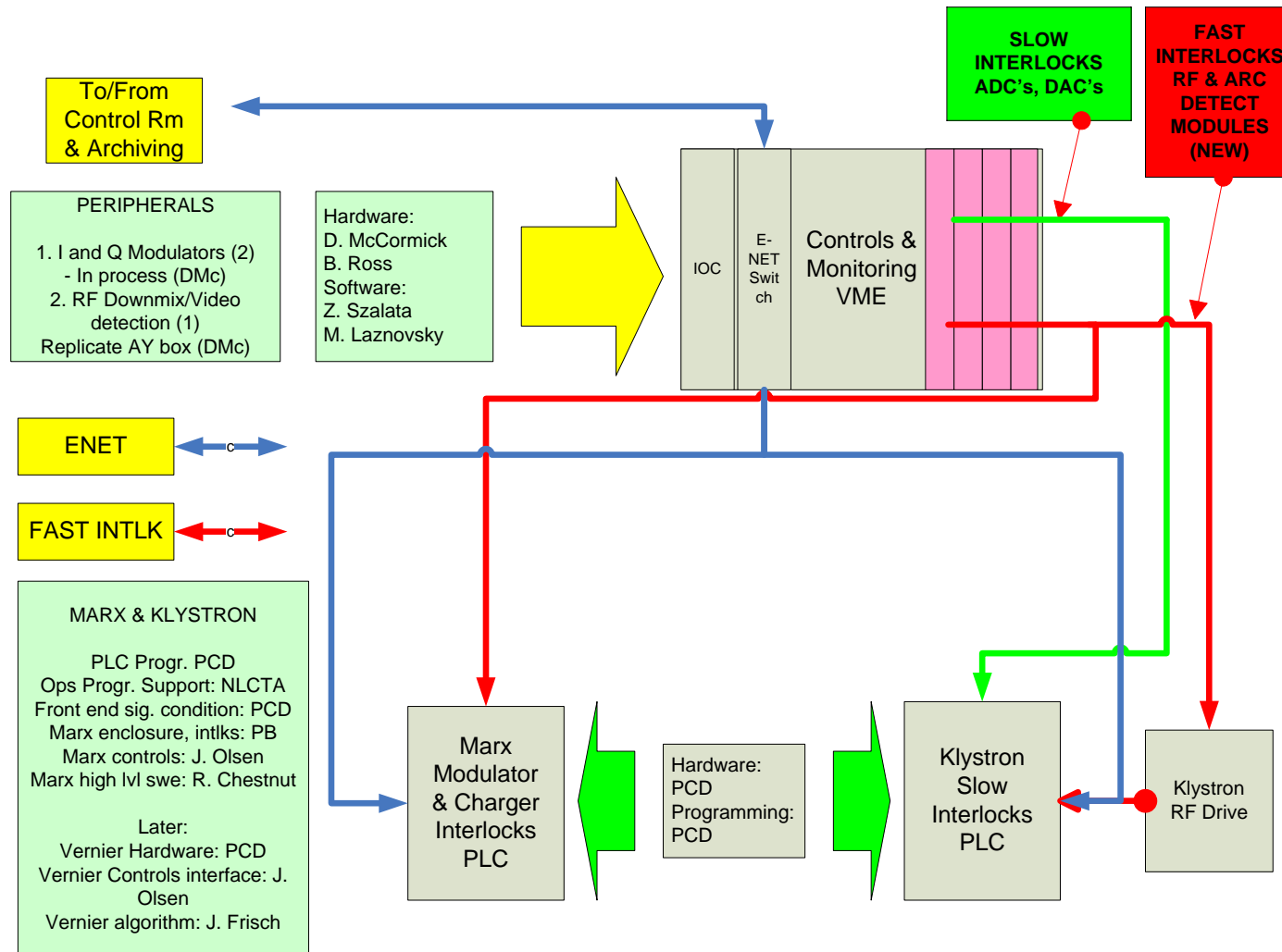
Phase I - VME Interlocks



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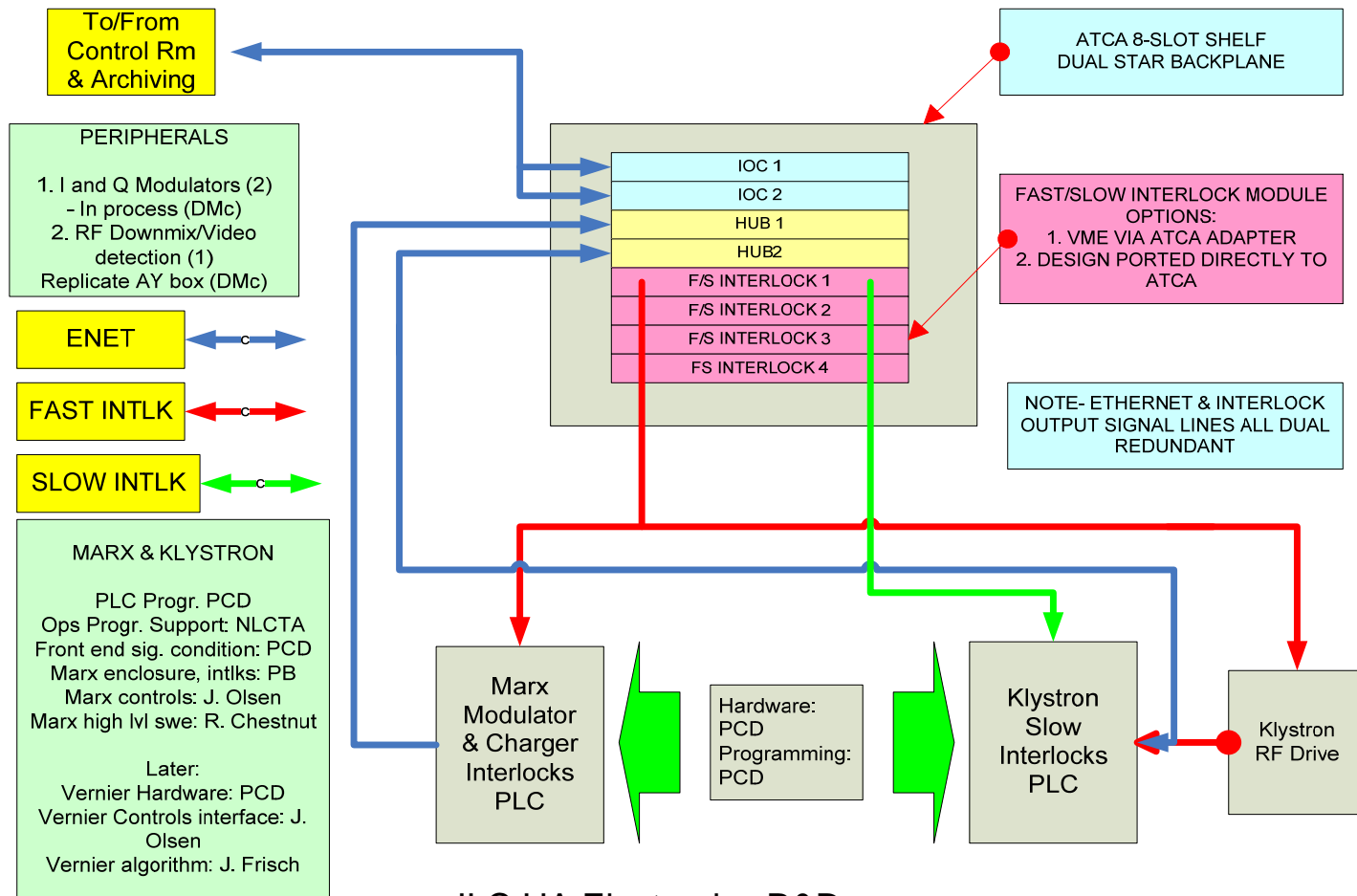
Phase II – VME Fast/Slow Interlocks



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Phase III – ATCA Shelf w/ Fast/Slow Interlock Modules



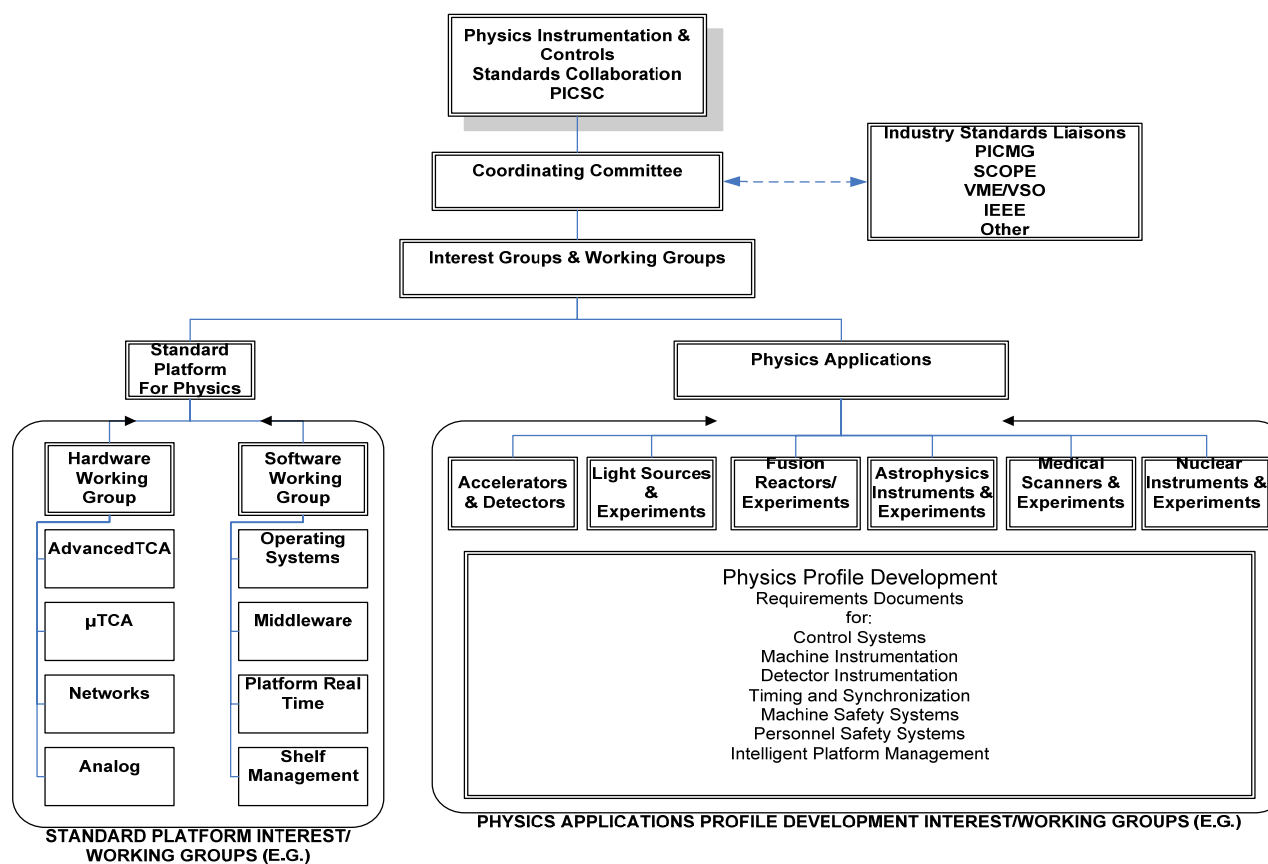
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Standard ATCA Profile for Physics

- Draft Profile for AMC Cards
 - *A draft is in circulation among small group along with proposal for collaboration to down-select features for physics applications*
 - *Plan is to include interest groups in accelerators & large detectors; fusion, astro, photon machines & experiments; nuclear physics fields*
 - *Will be expanded as needs dictate based on growing body of experimentation with ATCA, AMC, μ TCA, high speed digital and analog instrumentation applications, connector schemes etc.*

Discussion & Coordination



- Google group established for emails: atca4physics@googlegroups.com
- Wiki site for documents, responses: <http://groups.google.com/group/atca4physics/web/physics-profile-discussion-summary>

DESY XFEL Workshops

- Two one-day workshops held December 3-4
 - Attended by reviewers from ANL, FNAL, SLAC (Downing) and Industry (SAIC)
 - **LLRF**- Propose packaging on standard ATCA full card platform; development well along
 - **Crate Standard** – Propose using ATCA and μ TCA (small AMC card chassis)
- Results:
 - Some management worries about meeting timelines, possible technical risk. Want comparisons, backup plans.
 - Eckhart Elsen proposes that ILC program can directly contribute, help assure success; details to be discussed

Proposed Workshops

- GDE Meeting, Sendai, March 2008
 - *Researching organizing one or more sessions as tutorials, examples of R&D underway, industry developments*
- 2008 NSS-MIC Conference, Dresden, November 2008
 - *NSS organizing committee approved 2-day ATCA workshop as part of Short Course program*
 - *Program committee includes reps from Saclay, SLAC, FNAL, ANL, KEK, DESY, Juelich, others tbd.*

VME-ATCA Adapter Progress

- Phase I – Circuit and Software Platform
 - Design review held last December 11; Phase I is complete
 - Identified small additional power board to be added to Phase II
- Phase II – Complete layout, board fab, testing 3 units, deliver with software
 - Phase II start approved and Purchasing about to be activated
 - Quote for additional board design due this week
 - Completion date ~end of March assuming no significant contract delays as experienced in Phase I.
 - SLAC will contract with layout house and purchase/supply parts for 3 units

Examples of ATCA Work in Progress

- Machine Instrumentation
 - LLRF, Interlocks, chassis standards - DESY
 - 12 Ch 16-bit BPM board design - FNAL
 - Plan for L-Band interlock transition to ATCA - SLAC
- Experiments
 - AGATA Global readout System – LNL, Fr.
 - CMS Trigger System Upgrade – CERN, Imperial College, Princeton
 - Generic High Speed DAQ Board and Hub – SLAC (Huffer & Haller group)
- Together these efforts explore most key features of ATCA analog and digital performance

Other HA Work at SLAC

- High Availability design is being investigated in the following areas:
 - *DC N+1 modular power systems*
 - *Power system redundant controllers*
 - *Fast pulse kickers for ILC damping rings*
 - *Diagnostic systems for Intelligent Platform Management (IPM) power equipment such as large bulk supplies, Marx Modulators, short pulse induction modulators*

Conclusion

- **HA Design Has Arrived**
 - *Spurred initially by telecom industry developments coupled with HA analysis of needs of ILC*
 - *Essential for design of systems to meet stringent requirements in next-generation machines*
 - *Effective package for high performance and low cost; HA features optional*
 - *Developing over a wide range of technical areas*
- **Next steps:**
 - *Establish effective collaboration for standardization, interoperability of equipment built around the physics world*
 - *Coordinate with industry groups & manufacturers*