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# MicroTCA-based Motion Controller

Synchronous multi-axis motion control systems integrated with diagnostic and data acquisition subsystems are critical components in large experimental physics projects. To meet these specific requirements, DESY has developed an open-source motion control solution based on the DAMC-MOTCTRL board. Designed for projects like PETRA IV, this system enables synchronized control of up to 48 stepper motors on a single AMC board, interfacing with established control systems such as DOOCS, EPICS, and TANGO, or through a direct ASCII interface.

After presenting the alpha firmware version of this controller last year, significant progress has been made. The motor control logic has been substantially revised, enabling closed-loop operation with incremental encoders and other essential features. Synchronous control of up to 16 motors is now supported, with plans to scale to 48 in the near future. In parallel, work is ongoing to implement an industry-standard interface to synchronize motion control with other experimental devices.

This presentation will provide an overview of the hardware and firmware architecture, introduce the latest features, and outline the roadmap for the PETRA IV motion controller.

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