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Status Update on the Open-Source Synchronous Multi-Axis Motion Controller Solution for Large-Scale Experimental Physics Projects

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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.

Since last year's status update, significant progress has been achieved in the firmware development. The internal motor-control architecture has been redesigned around the CANopen CiA402 profile, which defines an industry-standard framework for motion control. As part of this redesign, closed-loop operation with incremental encoders has been added, along with other essential motion-control features. This standardization provided the basis for implementing the first native TANGO interface for the controller.

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

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