
HARMONI's Adaptive Optics Control System: Design and Performance Update

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Abstract

HARMONI is a first light instrument for the European Extremely Large Telescope (ELT) that uses near-infrared integral field spectroscopy to capture detailed spectral information across astronomical objects. The Adaptive Optics Control System (AOCS) for HARMONI is designed to correct for atmospheric turbulence and ensure high-quality imaging. The AOCS for HARMONI is a critical component that enables the instrument to achieve its scientific goals and will be essential for future astronomical observations.

We present the design and performance of the AOCS for HARMONI. We provide a detailed status report of our development efforts, with a focus on the system design and the results of our recent prototyping efforts. Specifically, we present the prototype of the HARMONI hard real-time control system (HRTC) and its design, including timing results from a full-scale HRTC in the laboratory. We have recently updated our designs with the development of Durham's next-generation AO RTC called DAO, which has been shown to meet the requirements will help HARMONI achieve its scientific goals.

We also present the design and status of the soft real-time control system (SRTC) for HARMONI, including algorithm performance results that drive computation and system dimensioning. Additionally, we discuss the integrating of the AOCS with ESO's Real-Time Control Toolkit (RTCtk).

Keywords: AO RTC, RTC, real, time control, DARC, DAO, SRTC, HRTC, HARMONI, AOCS

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