“Wavefront preserving mirrors at LCLS”

The Linac Coherent Light Source (LCLS) of SLAC is upgrading the facility to an High Repetition Rate mode and to a higher quality of the wavefront. This poses extreme challenges to the optical components. A new approach to beamline design is needed, starting from a new way to assess the effect of slope and shape errors, to the need of take into account any potential source of distortion. To deliver this performance, the mirrors need height errors below 1nm rms in operational conditions. A mirror cradle was developed with a novel adjustable length cooling scheme and first order curve correction. Ultra flat mirrors were recently installed in this cradle in the LCLS beamline. Another important aspect, is the cleaning process to remove, in situ, carbonaceous contamination from carbon based coatings. A controlled method has been developed and successfully implemented in the SXR mirrors to remove the carbon without affecting the coating. Design of the mirror system is presented as well as first results of the improvement in beam quality and carbon removal process.

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Corey Hardin

PhD, Mechanical Engineering

Linac Coherent Light Source – Optics Group

SLAC National Accelerator Laboratory

2575 Sand Hill Road, Menlo Park, CA, 94025

Office Phone Number: 650-926-2494