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Advancing Stability in X-Ray Laser Optics: Interferometric Solutions for SLAC's X-ray Cavity Project

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The progressive development of X-ray laser sources requires high stability of optics that are distributed over large distances. X-ray laser amplifiers, which rely on the coherent superposition of circulating micron sized, femtosecond x-ray pulses in cavities, place demands on length and angular stability in the 100s nanometer and nanoradian range. They also need to interact with the gain medium, hence the similarly sized electron bunches from the linear accelerator in the undulator. Passive mounting and periodic adjustment can no longer cope with the dynamics of the ground motion, induced by environmental changes including temperature, water flow, and even tidal waves. This requires active control of the optics individually or in local clusters in relation to a global system, such as alignment to the undulators. We present how laser interferometers can serve as tools for measurement and active control of X-ray laser optics and present a design to stabilize the X-ray cavity in planning for SLAC's extension of LCLS.

I plan to submit also conference proceedings

No

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