Development and calibration of beamsplitters for use on interferometry at 13.9 nm.

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In this paper we present the development of a new type of beamsplitter optimized for use on soft X-ray Michelson interferometer for probing laser-produced plasmas with a 13.9 nm x-ray laser. The optimized configuration for the beamsplitter has been achevied by depositing Mo/Si multilayers on both sides of a very thin x-ray transparent substrate (membrane).

The membrane is made of 100 nm thick silicon nitride. Numerical simulations were done to determine the right coating conditions for the best compromise between reflectivity, transmitivity and flatness. Several multilayer Mo/Si coatings were deposited on silicon nitride membranes by ion beam sputtering. Layer thicknesses were controlled by *in-situ* reflectometry at 4.47nm. *Ex-situ* glancing x-ray reflectometry at 0.154nm was used to confirme *in-situ* measurements and to investigate multilayer quality (materials indices, interfacial roughness). Stress induced by multilayer deposition has been determined by measurements of the silicon substrate curvature before and after deposition.

Experimental results on both side multilayer coated beamsplitters will be shown and discussed. X-ray transmitivity and reflectivity of this beamsplitter around 13.9nm measured using synchrotron radiation will be compared with simulation predictions.

The feasibility of such beamsplitter based on B/Si multilayer system will be also discussed.