

X-ray KB microscopes with double-periodic multilayers

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Abstract: Kirkpatrick-Baez (KB) microscope is one of the key diagnostic tools in inertial confinement fusion research. Compared with X-ray pinhole camera, the common X-ray imager, it has larger collecting angle and better resolution, so widely used in Omega, LMJ and so on. The analysis of the aberrations and optical errors of KB microscope indicated a very serious tolerance for grazing incidence angle. Therefore, the alignment of grazing angle and assembly of mirrors are correspondingly strict. Especially for soft X-ray KB microscope, alignment and assemblage have to be done in vacuum for the reason of strong absorption of soft X-ray in air, which makes the operations rather difficult. In this presentation, a special multilayer mirror will be used in KB microscopes, which could work not only at 4.75keV and 2.5keV but also at 8keV along same light trace in order to overcome the complex and difficulty in the alignment and assemblage in the vacuum. We can implement the alignment and assembly of 4.75keV or 2.5keV systems by the help of 8keV X-rays. Because 8keV X-rays is very easy produced by Cu X-ray tube and has strong transmittability in air, the alignment and assemblage process became relatively easy. By now, we have finished the alignment experiment at 8keV and imaging experiments at 4.75keV or 2.5keV. The performance of the KB microscopes is about 2-3 μ m resolution in 250 μ m field of view. It is coincide with the simulations.

Acknowledgement: This work is supported by the National Natural Science Foundation of China (Grant No. 10825521, 10876023, 10876023, 1 and 0773007), by Hi-Tech Research and Development Program of China (2006AA12Z139), Shanghai Education Development Foundation (2008CG25), Shanghai Natural Science Foundation (Grant No. 09XD1404000, 07DZ22302, 0952nm06900, 09ZR1434300) and Young talents foundation of Tongji University.

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