# The preliminary results of neutron imaging system in the exploded implosion experiment on the 100 kilo-Joule laser facility

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Neutron Imaging System can be used to image the burn volume and cold fuel volume of imploding fusion capsules. In this work, the neutron imaging system based on the penumbral aperture for the inertial confinement fusion research in LFRC has been developed. A geometric model [1] has been developed to assess the performance of the neutron imaging system, including the spatial resolution, the field of view and the signal-to-noise ratio. The aperture has been fabricated by machining one half double-tapered cylinder into each of two tungsten slabs. The aperture is mounted into a box which helps to precisely fix two slabs to form a biconic-shaped aperture. A model based on the neutron elastic scattering theory has been developed to understand the spatial resolution of the neutron image recording system. The model has been validated by the MonteCarlo neutron trasnport code JMCT. The neutron image recording system has been constructed with a capillary-array neutron image detector, and tested with the X-ray source and neutron sources. The spatial resolution of neutron image detector can be about 1 mm. The preliminary results of neutron imaging system in the exploded implosion experiment on the 100 kilo-Joule laser facility will be firstly presented in this presentation.

**References**

[1] Z. Chen et al 2019 JINST 14 C11007