

Calibration of the compact electron spectrometer for FIREX-I project in Gekko XII

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The high energetic electron measurement is one of the most important issues to research the ignition mechanism in the Fast Ignition Realization EXperiment Project. It is also important for the energy spectra with angular distribution because the electron spread is different by the target design. We have been developed the compact Electron SpectroMeters so as to be installed on different angular potions. Number and size of viewing ports are limited in Gekko XII target chamber I. We use the most popular 6-inches port. The triangle shape of the magnet is chosen due to the compactness and the wide energy range. We can save the space since the magnet is hidden in the target chamber. The electron beam enters obliquely into the analyzer in order to obtain the wide observable energy range. A neodymium alloy is used as the permanent magnet. Therefore the accurate beam trajectory calibration is necessary. The imaging plate is used as the electron detector. However the relation between the beam intensity and the detector signal has not been clear. We have performed the calibration using L-band LINAC in the Institute of Scientific and Industrial Research, Osaka University. The calibration has been done using single pulse at two different energies of 9.5 MeV and 27.1 MeV with 0.1-10 pC. Electron beam from LINAC passes among air. Own vacuum chamber is prepared because the beam scattering by air should be minimized. The beam size is 5 mm at the exit of the beam line and 10 mm at 13 cm from the exit in air. The energy spreads are 0.2 MeV at 9.5 MeV and 0.3 MeV at 27.1 MeV, respectively. The energy calibration can be obtained as shown in Fig. 1. The analyzer has been tested to measure energetic electrons from the aluminum and gold plain targets irradiated by LFEX laser (maximum energy of 10 kJ) up to 800 J.

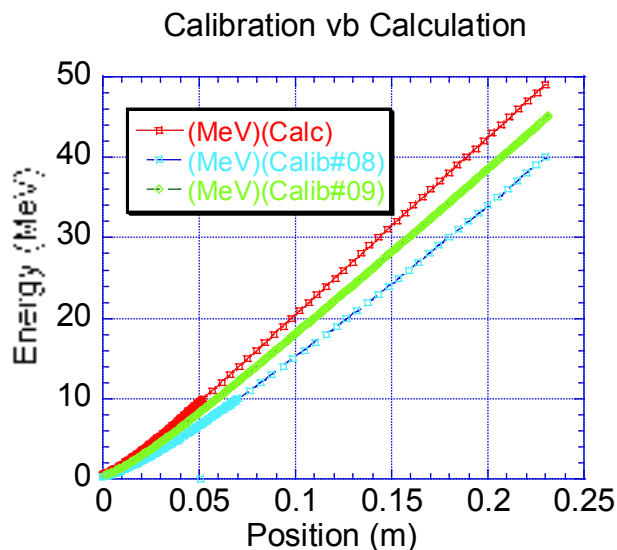


Fig. 1. Energy calibration curve.