# AbstractID: 4554 Title: Motorized multi-leaf collimator for electrons: measurements with a prototype and Monte Carlo simulations

**Purpose:** To develop a motorized multi-leaf collimator for electrons (eMLC) and to compare preliminary measurements to Monte Carlo simulations.

**Method and Materials:** An eMLC has been developed. It is the first prototype with fully motorized capabilities. The eMLC is remotely controlled by the operator using home brewed and fully graphical software running on a Windows workstation. The control workstation is connected to the eMLC's custom-built electronic controller which keeps track of the component states and executes various low-level commands, including leaf displacement orders. There are 36 independent brass leaves on each side of the eMLC and the maximum size of the generated field is 25.2 X 19.5 $cm^2$. The interleaf distance is less than 0.03 mm. The eMLC prototype is an add-on device for the Elekta Precise linac (Elekta Ltd., England). The actual distance from the source to the bottom of the leaves is 95.3 cm. The eMLC has been modeled using the BEAMnrc Monte Carlo toolkit and every possible leaf positions is reproducible with our Monte Carlo model.

**Results:** Various preliminary measurements were performed: open field, closed field, one leaf profile, interleaf leakage, leaf transmission, and comparison with conventional custom cutouts. For all measurements, comparison to Monte Carlo simulations are carried out. The transmission through the leaves is 2.4% for a 12 MeV field at the surface of a water phantom with SSD=100 cm. The interleaf leakage is negligible as no interleaf pattern is detected on a closed field profile for all the investigated energies (up to 12 MeV).

**Conclusion:** The motorized eMLC prototype is versatile and easy to operate with a computer control from outside the treatment room. Possible applications of the eMLC go from simply replacing the conventional custom cutouts to complex usages like MERT or electron arc therapy.

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