Chamber Efficiency at Higher Beam Flux

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As a final check on the performance of the E614 chamber with no field wires, the efficiency as a function of beam flux was investigated. The concern here is that with no field wires a possible build up of space charge around the edge of the cell might occur at higher flux due to the weak field region, resulting in a reduced efficiency.

Figure 1 shows the efficiency as a function of beam flux. Only three runs with higher than few hundred hertz were acquired in the August run, at 1.2 kHz, 5 kHz, and 20 kHz. Although the high voltage is not clearly labeled in the log book, it is believed to be 1950V. There is no reason to believe, however, that the high voltage was changed while these runs were acquired. The figure shows that the drop in intensity between 1.2 kHz and 20 kHz is about 0.2%. Since E614 will be running at a flux of few kHz, this drop is insignificant. Few wires in plane 2 seem to have bad electronics/connections when the 1.2 kHz data was taken, and have much lower efficiency than the rest.

Figure 2 shows the efficiency as a function of distance form the sense wire binned in 7 bins, where bin 7 is at the edge of the cell. The overall lower efficiency for the 1.2 kHz data is due to the bad electronics/connections in plane 2 (as mentioned above). While a drop in efficiency is noticed in the last two bins as the flux is increased from 5 kHz to 20 kHz, the amount of drop is insignificant.

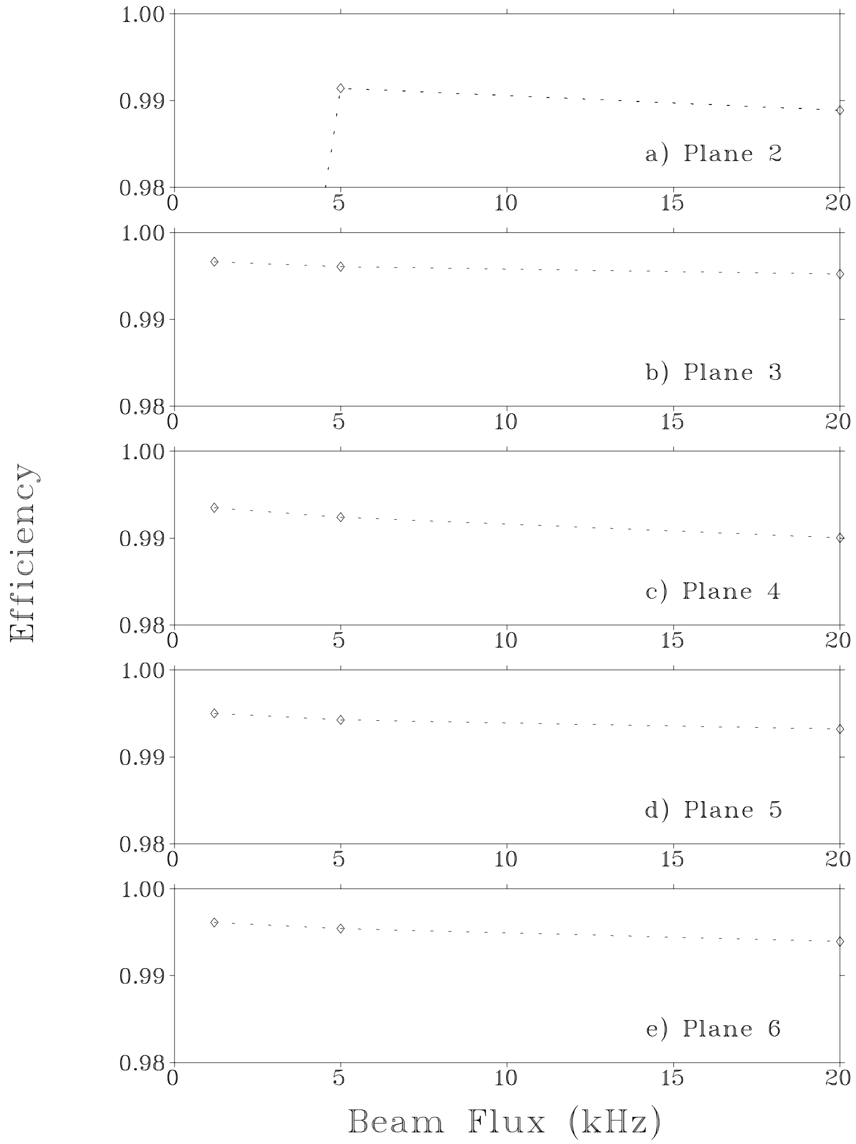

Figure 1: Efficiency as a function of intensity for each of the 5 X planes.

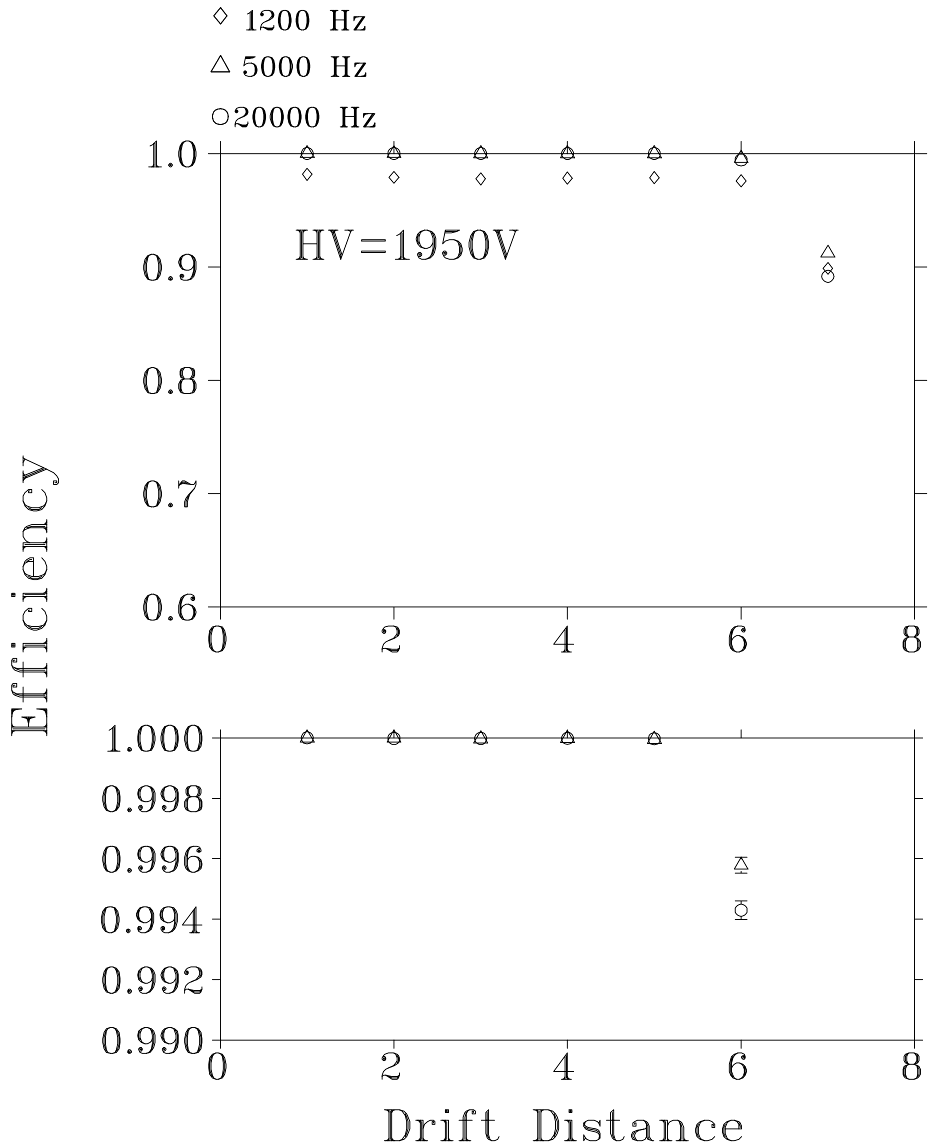

Figure 2: Efficiency as a function of distance from the sense wire for three runs acquired at the same high voltage, at a beam flux of 1.2 kHz, 5 kHz and 20 kHz. The distance from the sense wire is shown in terms of bin number where bin 7 is at the edge of the cell.