

# Acceleration and Focusing Measurements in Beam-Driven Plasma Wakefields at ATF

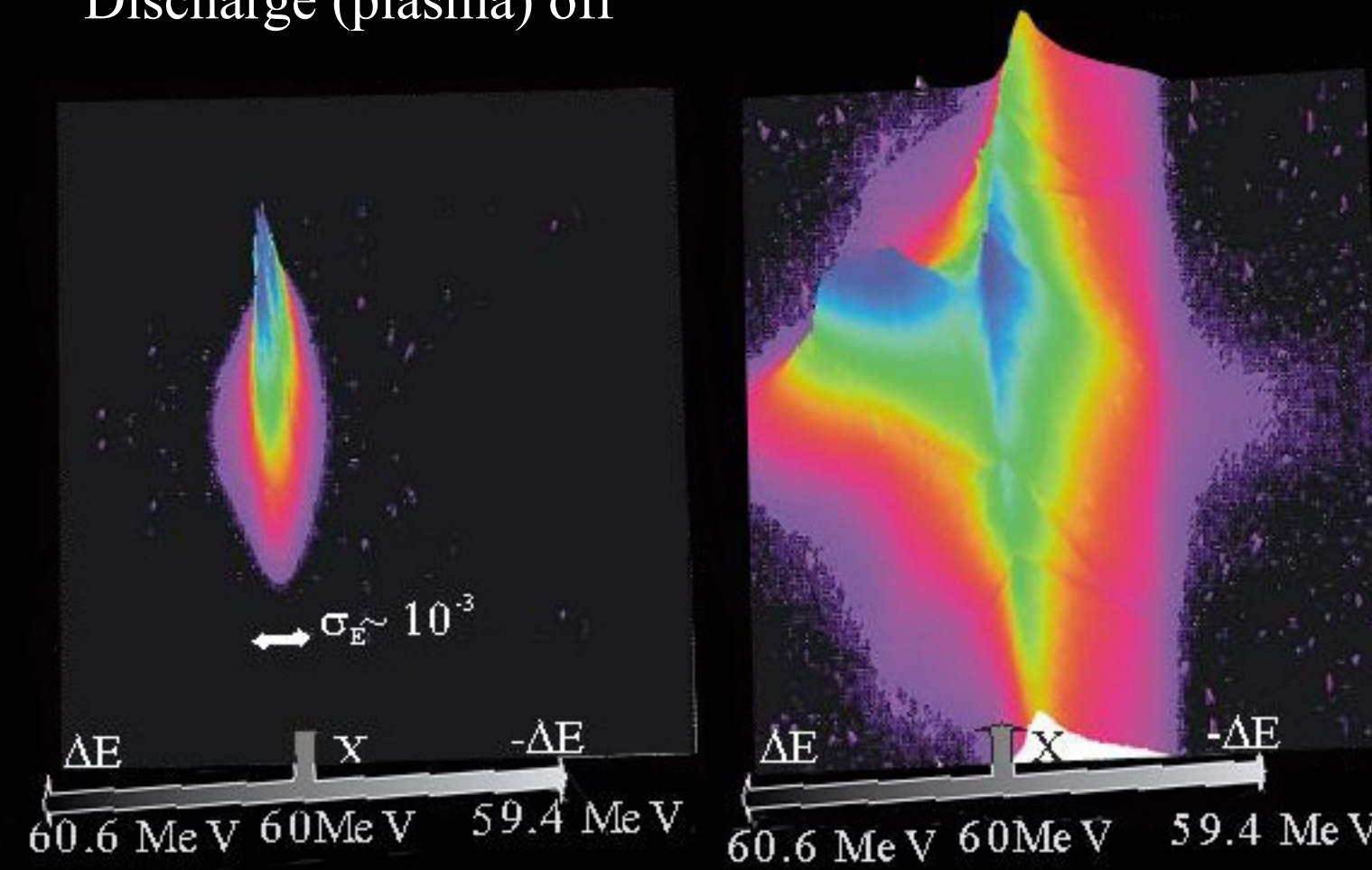
## Acceleration and focusing Measurements in Beam-Driven Plasma Wakefields at ATF

Phys. Rev. Lett. **91**, 014802 (2003)



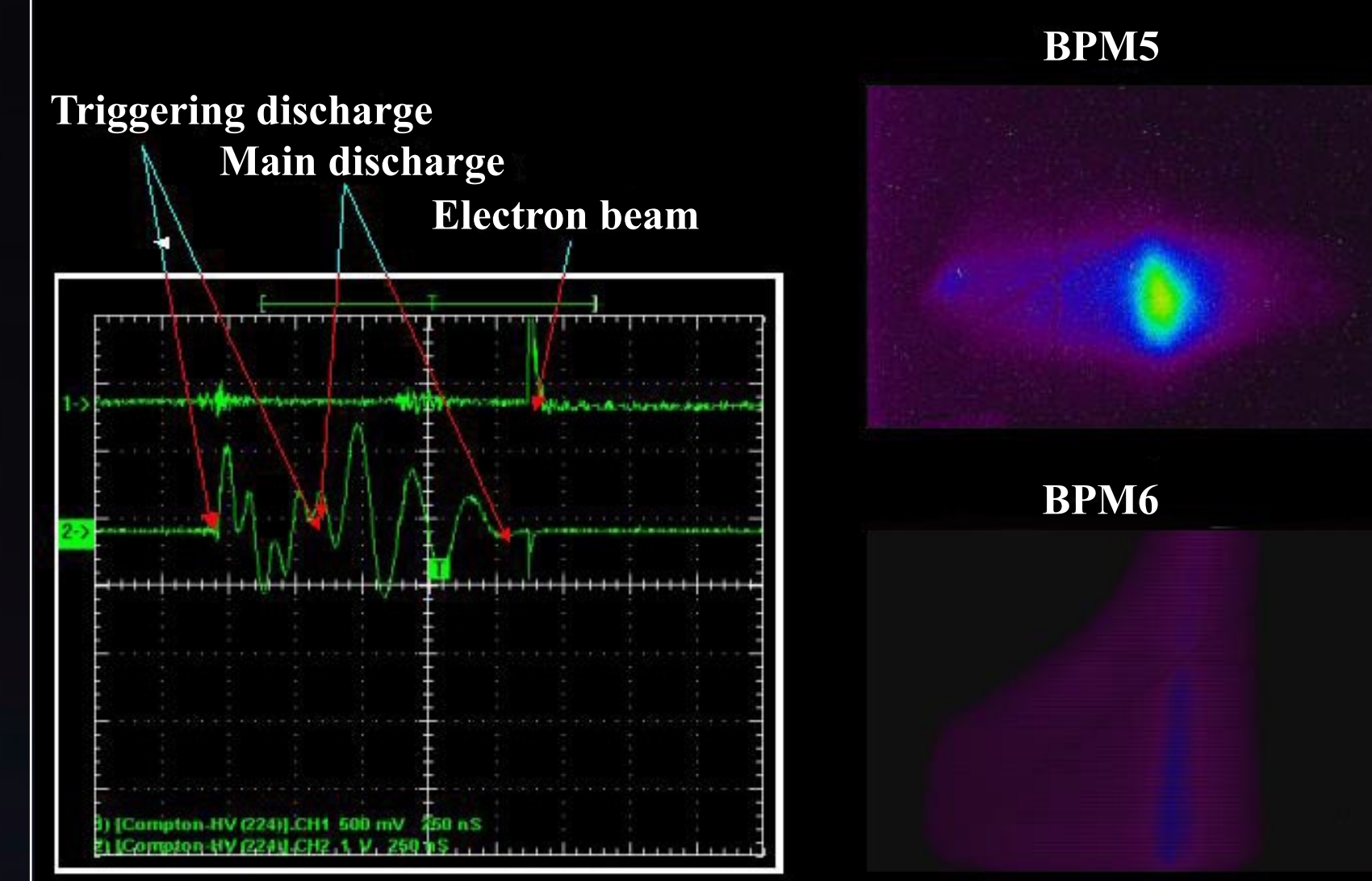
## The picture

Discharge (plasma) off      Discharge (plasma) on

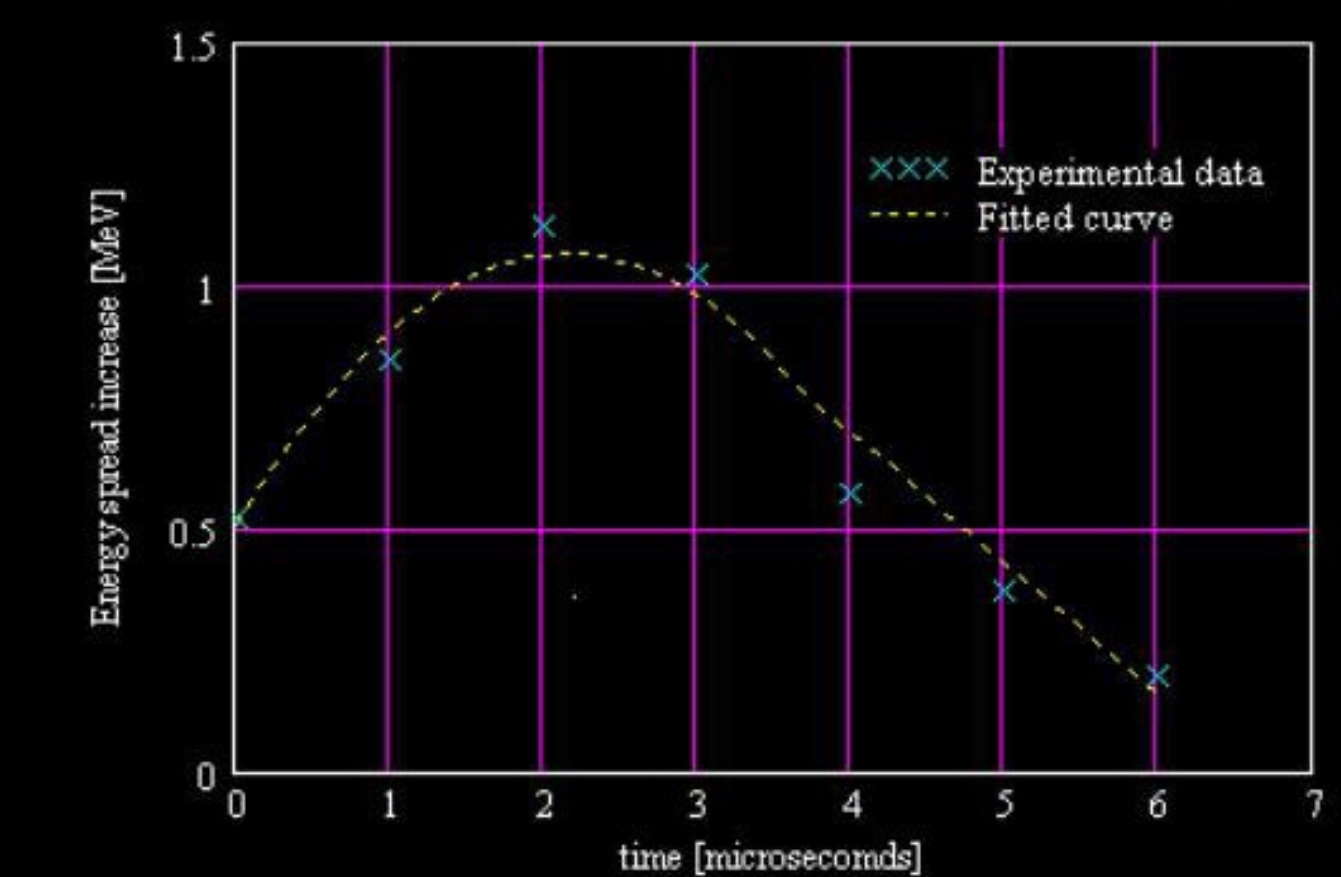


Energy distribution and transverse beam phase space dramatically changed after a 60 MeV, 0.5nC, 3 ps (FWHM) e-beam passes through 17 mm of  $\sim 10^{17}$  plasma.

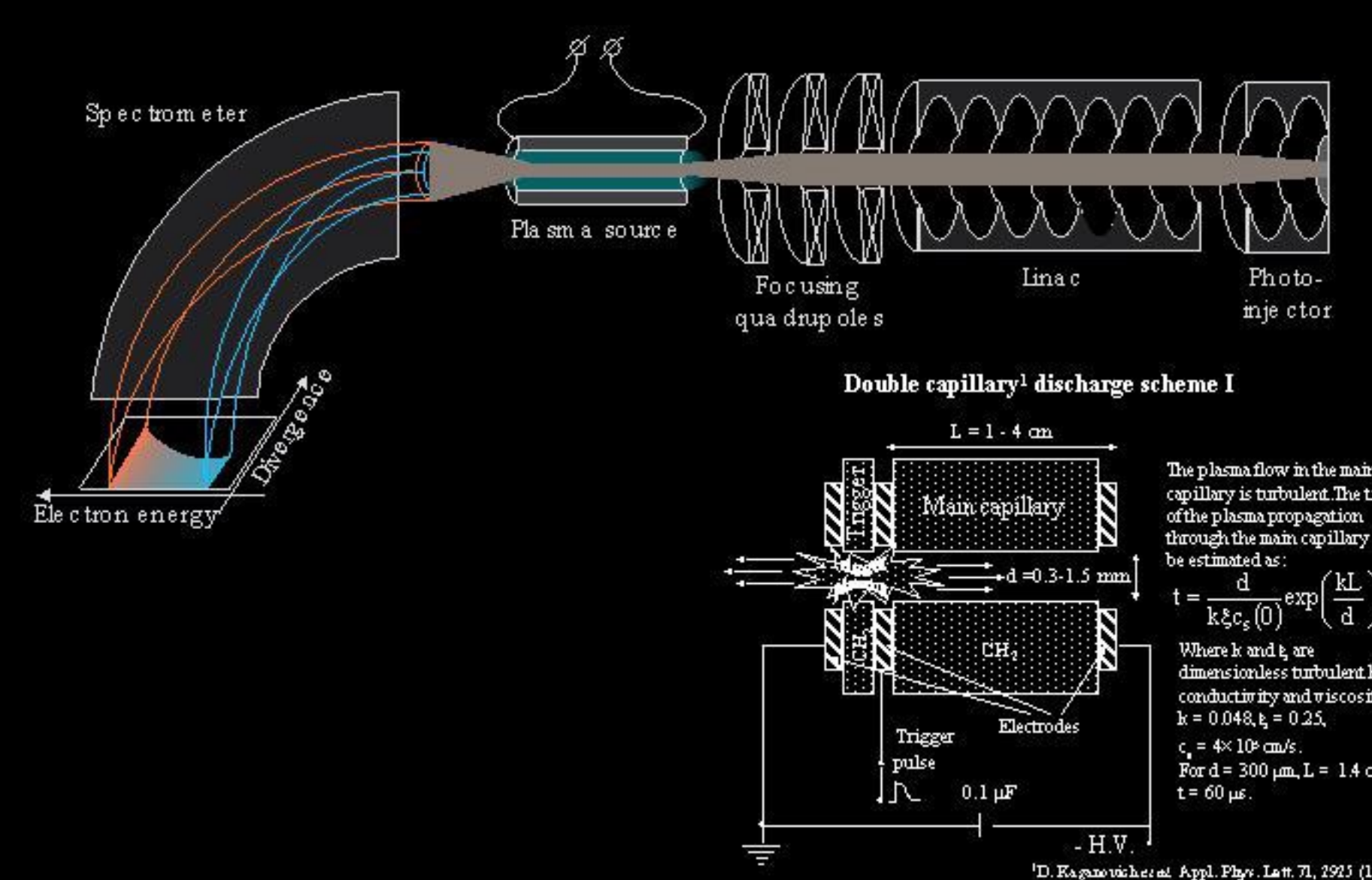
## Discharge Timing (delay set to 1.2 $\mu$ s)



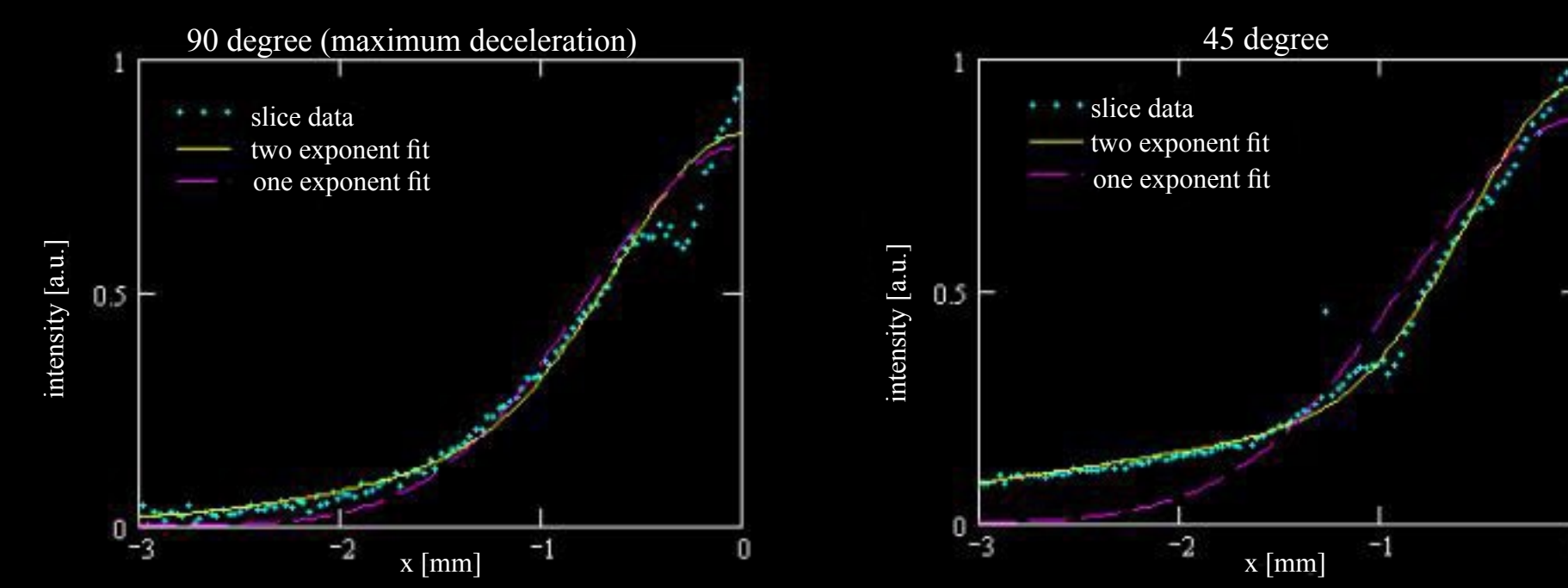
## Acceleration VS time



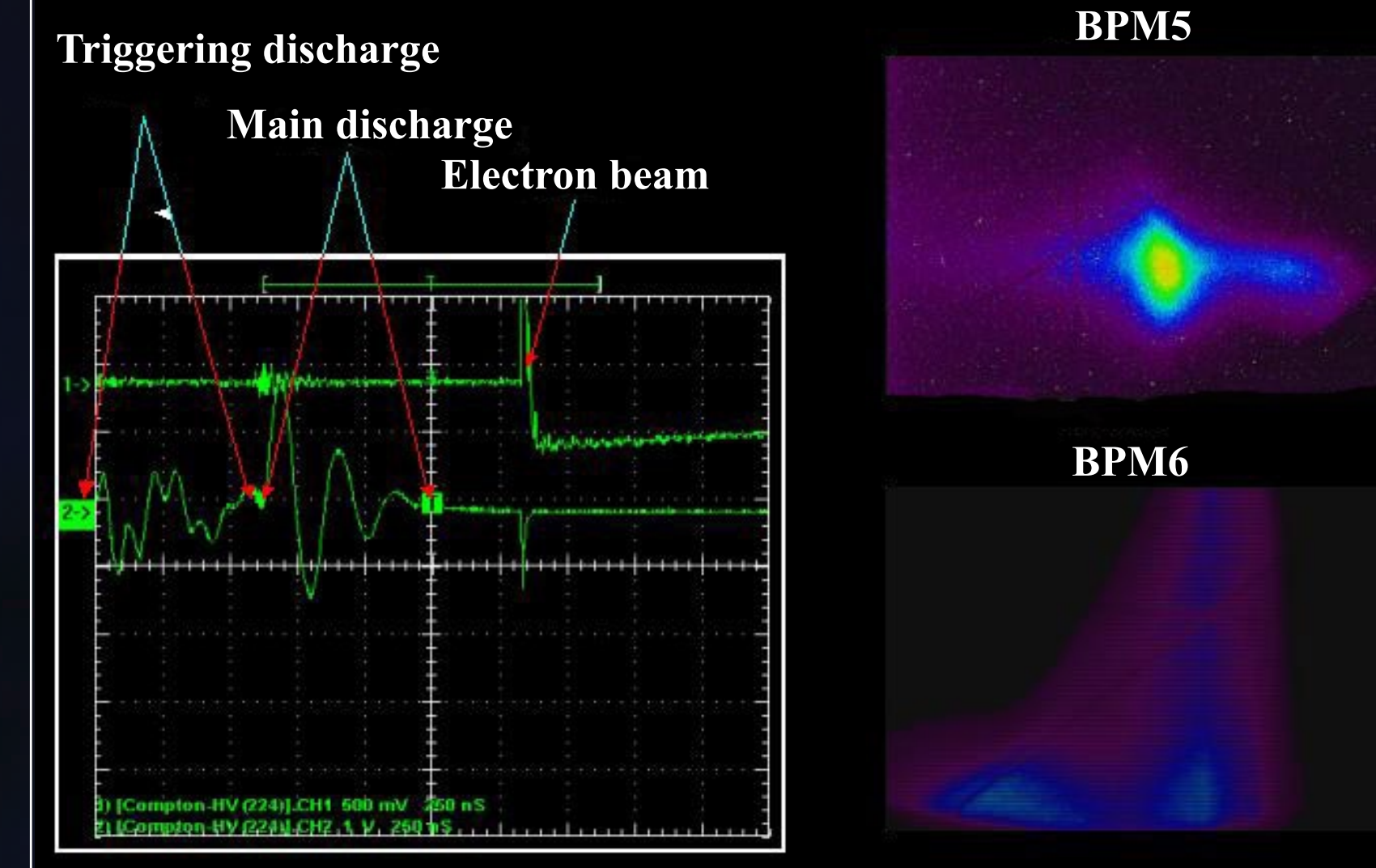
## Experimental setup



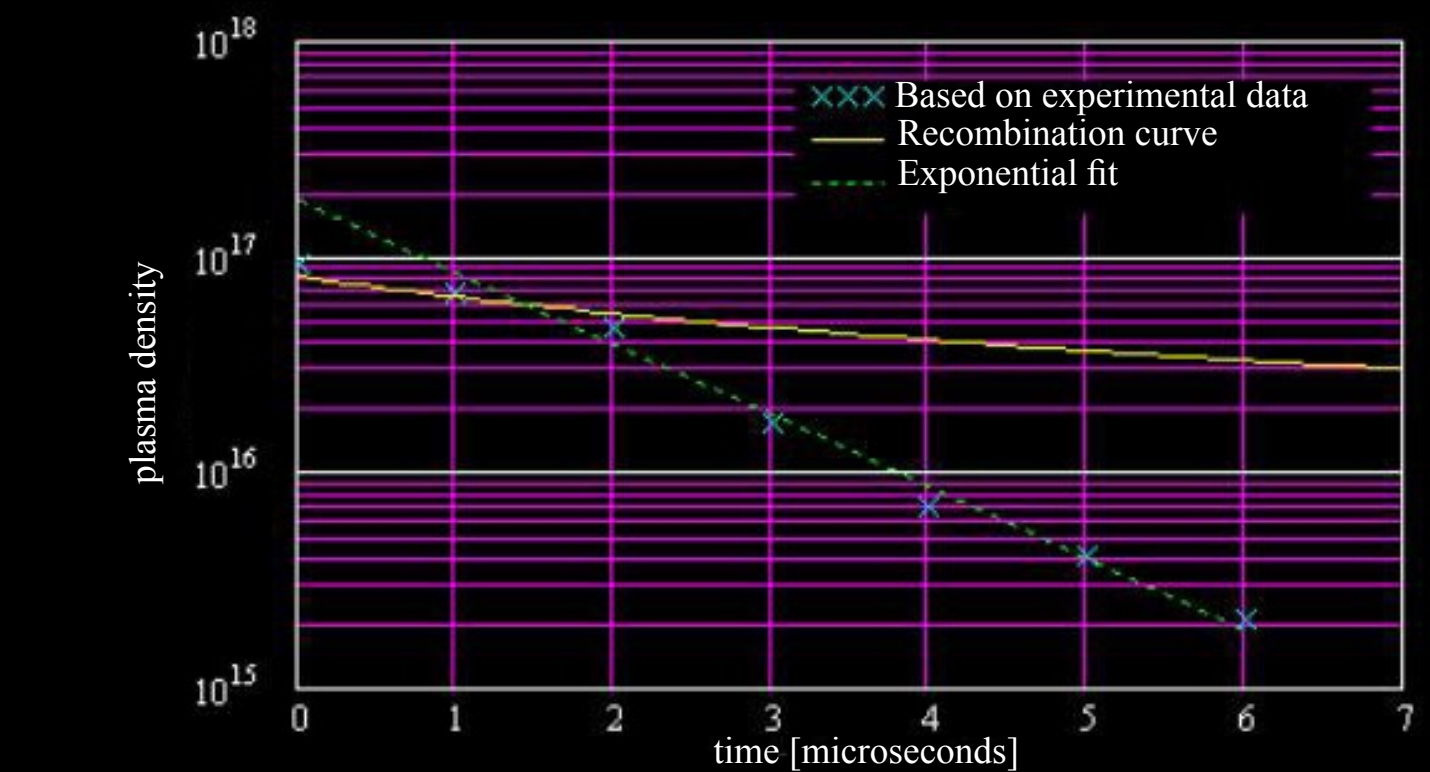
## Focus Vs acceleration



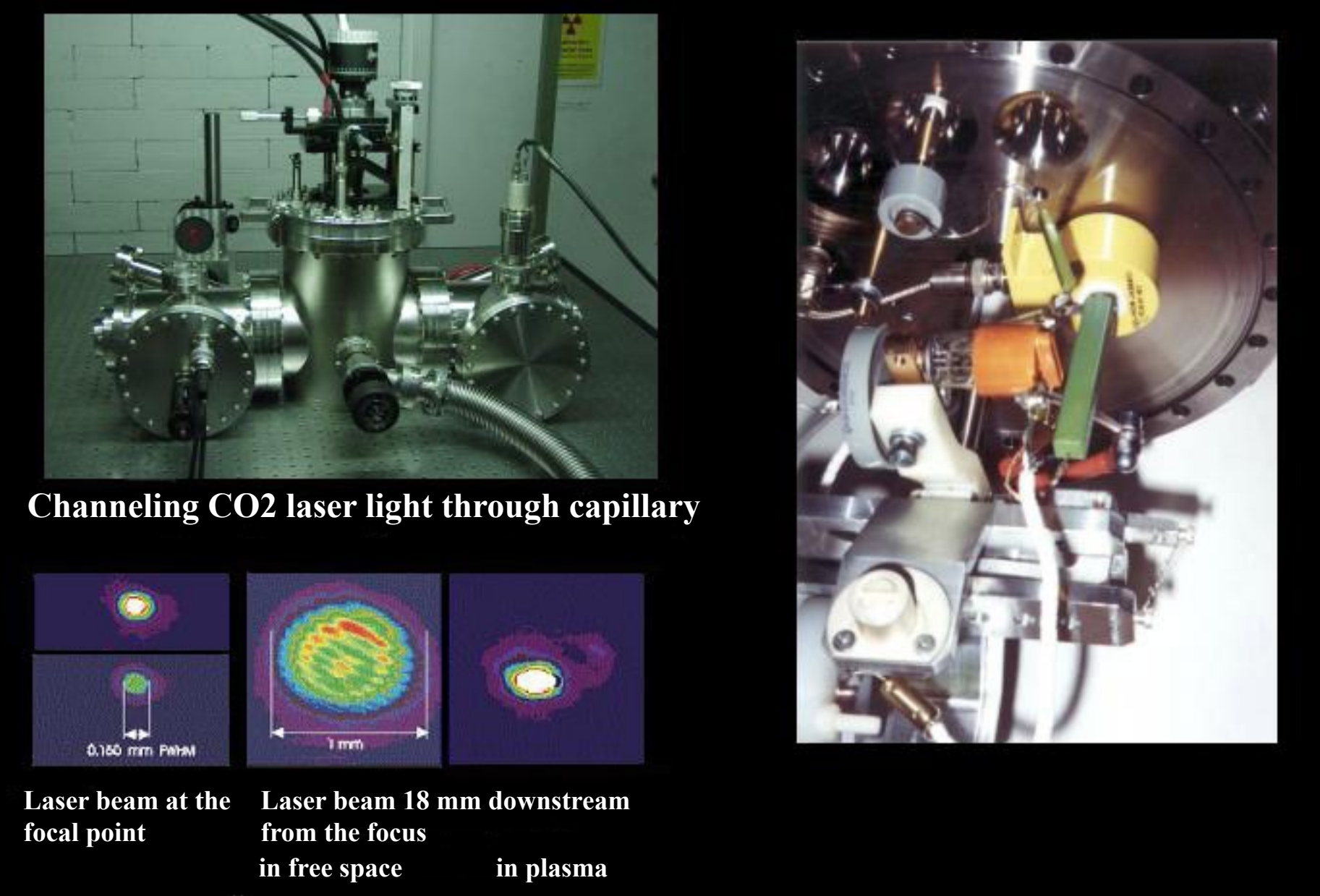
## Discharge Timing (delay set to 1.8 $\mu$ s)



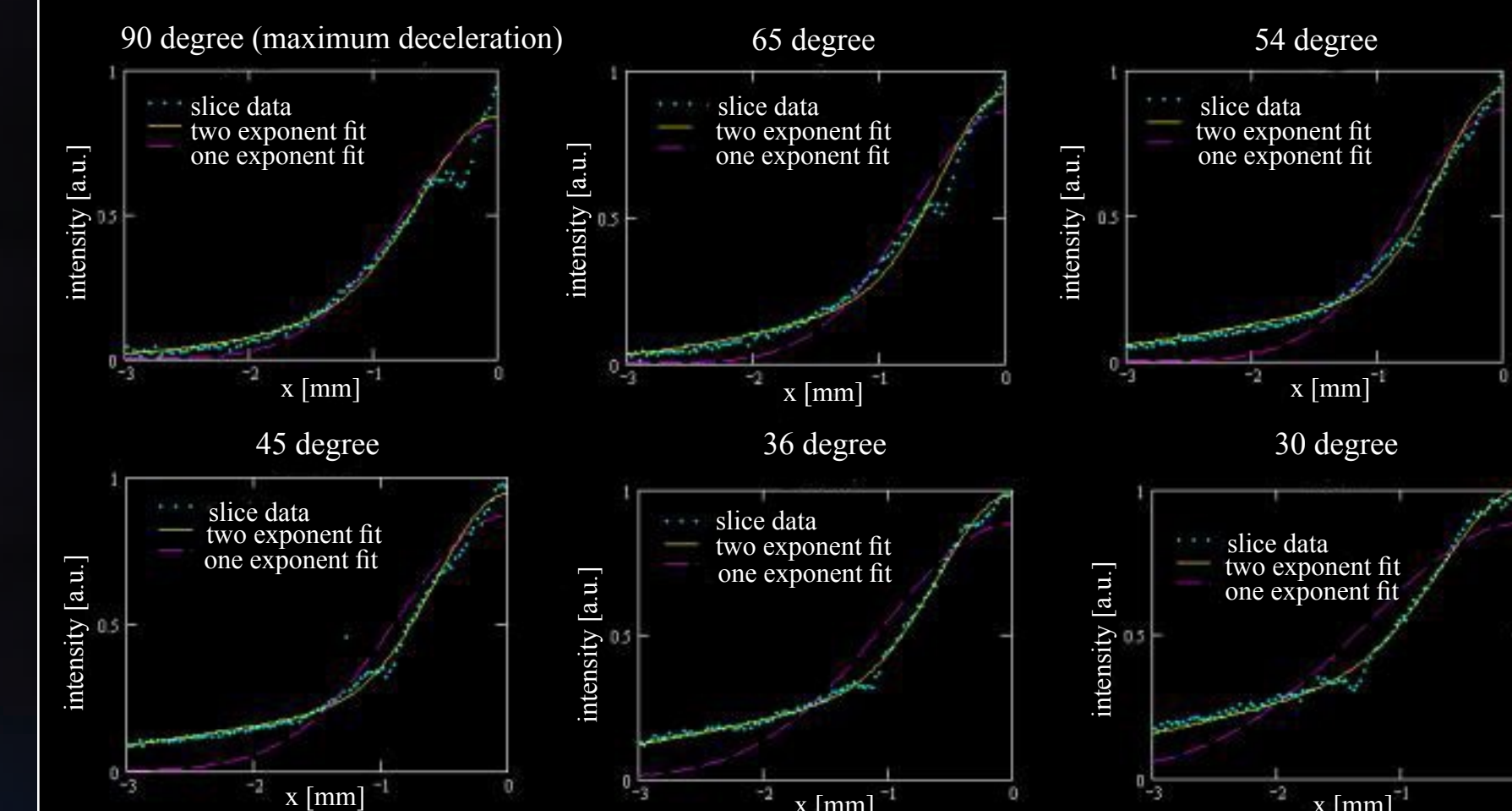
## Plasma density Vs time



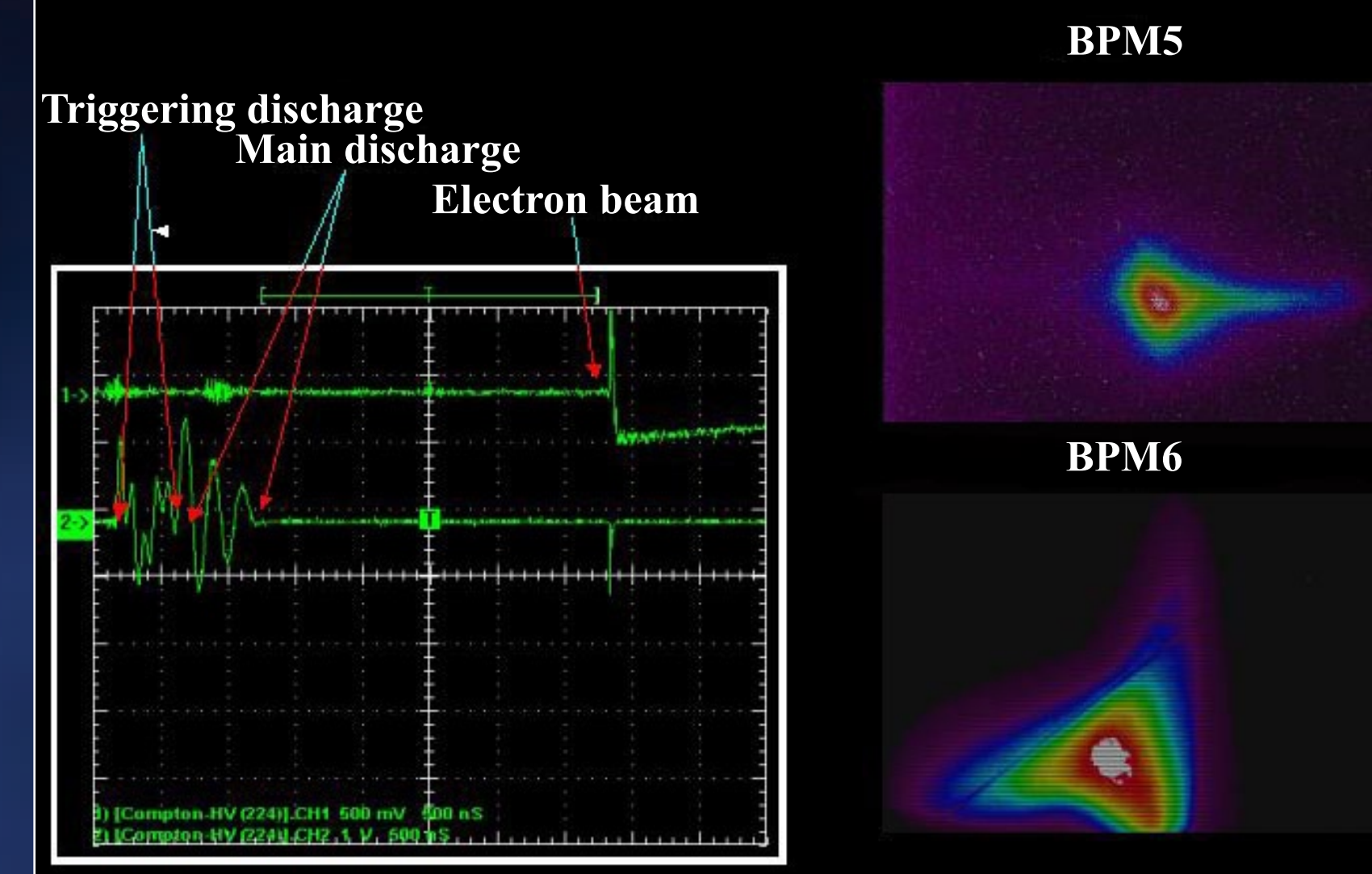
## Plasma source



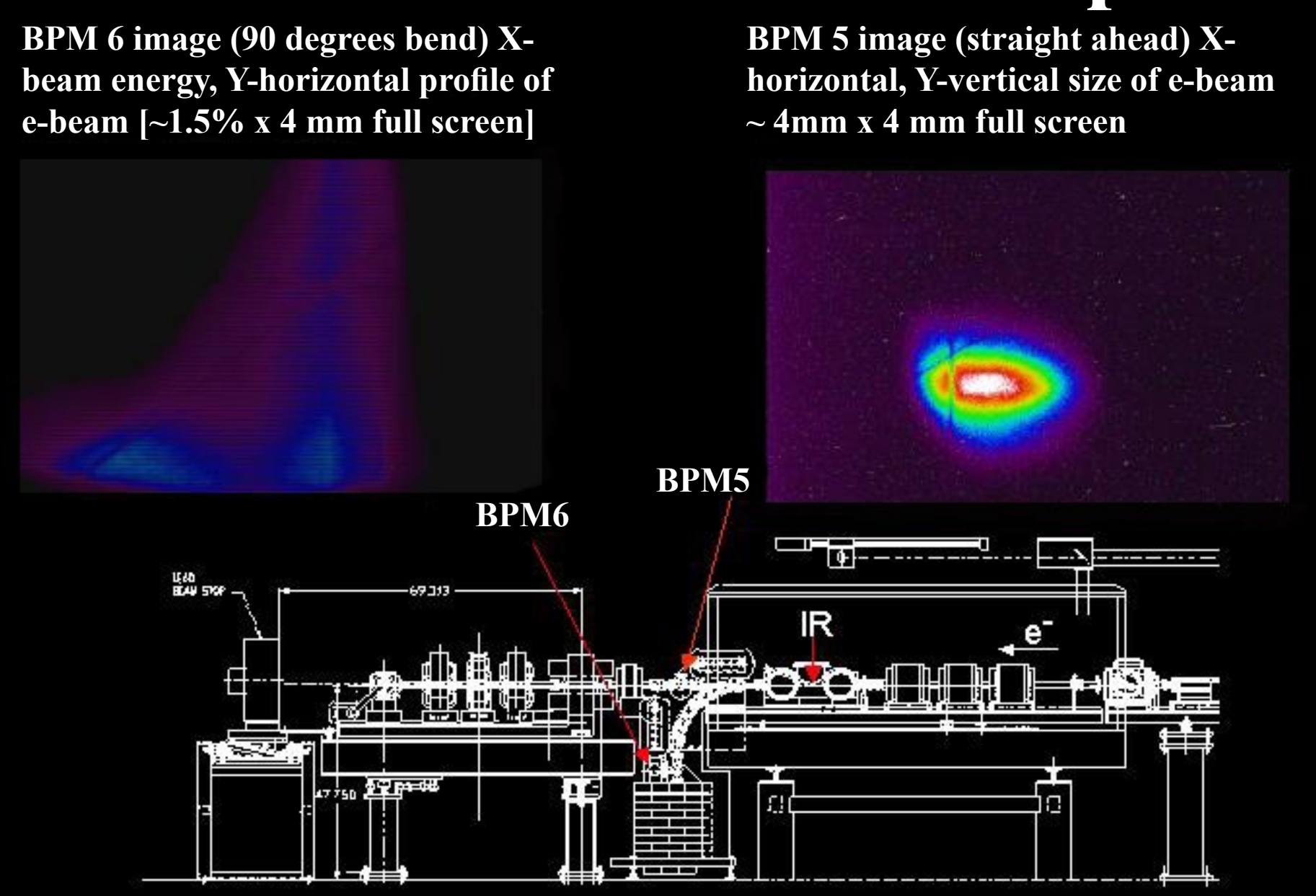
## Focusing Vs accelerating phase



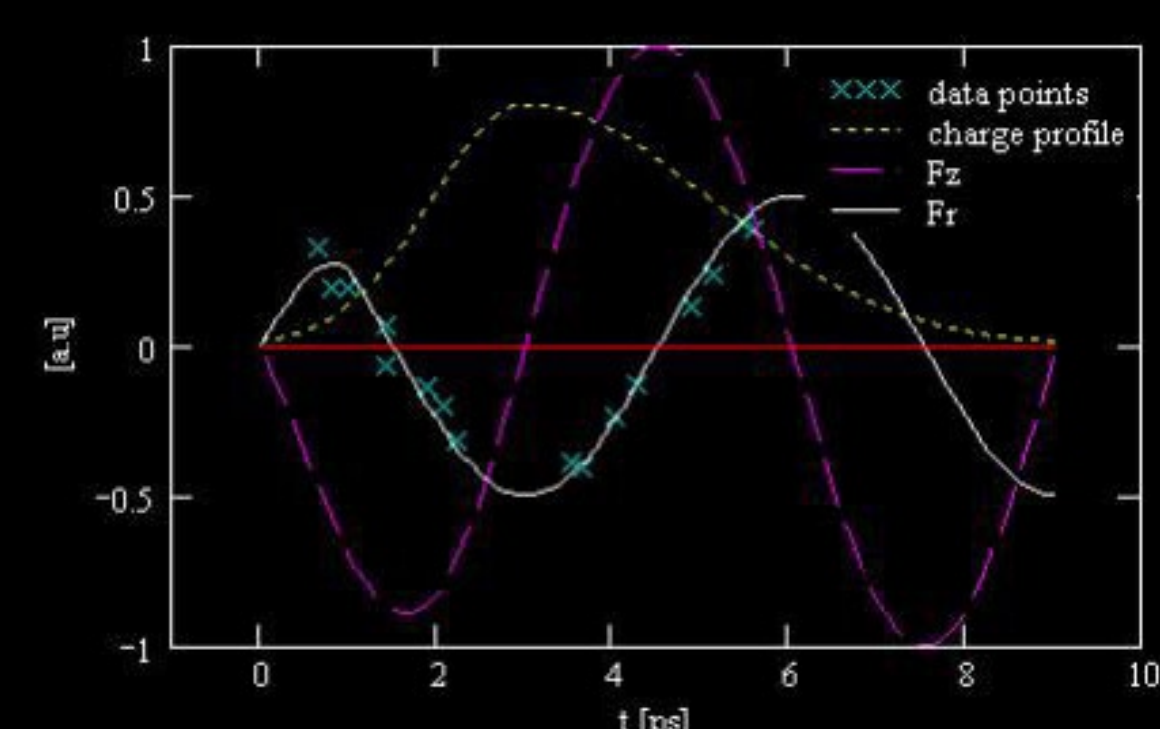
## Discharge Timing (delay set to 3.7 $\mu$ s)



## Electron beam observation points



## Correlation between longitudinal and transverse wakes phases



Beam size as a function of the wake phase. Solid lines schematically show expected longitudinal (blue) and transverse (magenta) wakes phases. Experimental points are reconstructed from the energy slices using double Gaussian fit.

## Discharge Timing (delay set to 5 $\mu$ s)

