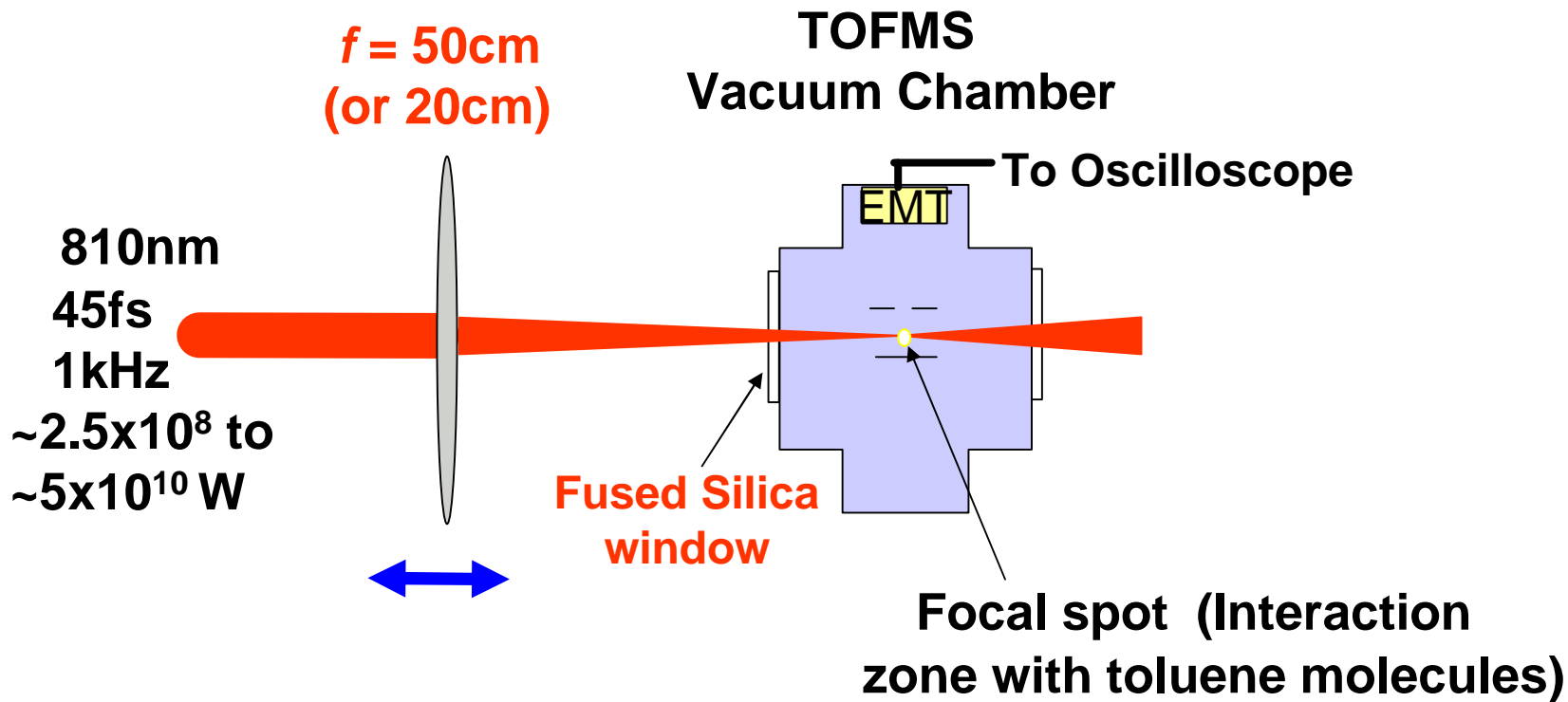


Enhanced Ionization and Fragmentation of Toluene Molecules by Nonlinear Propagation of Femtosecond Laser

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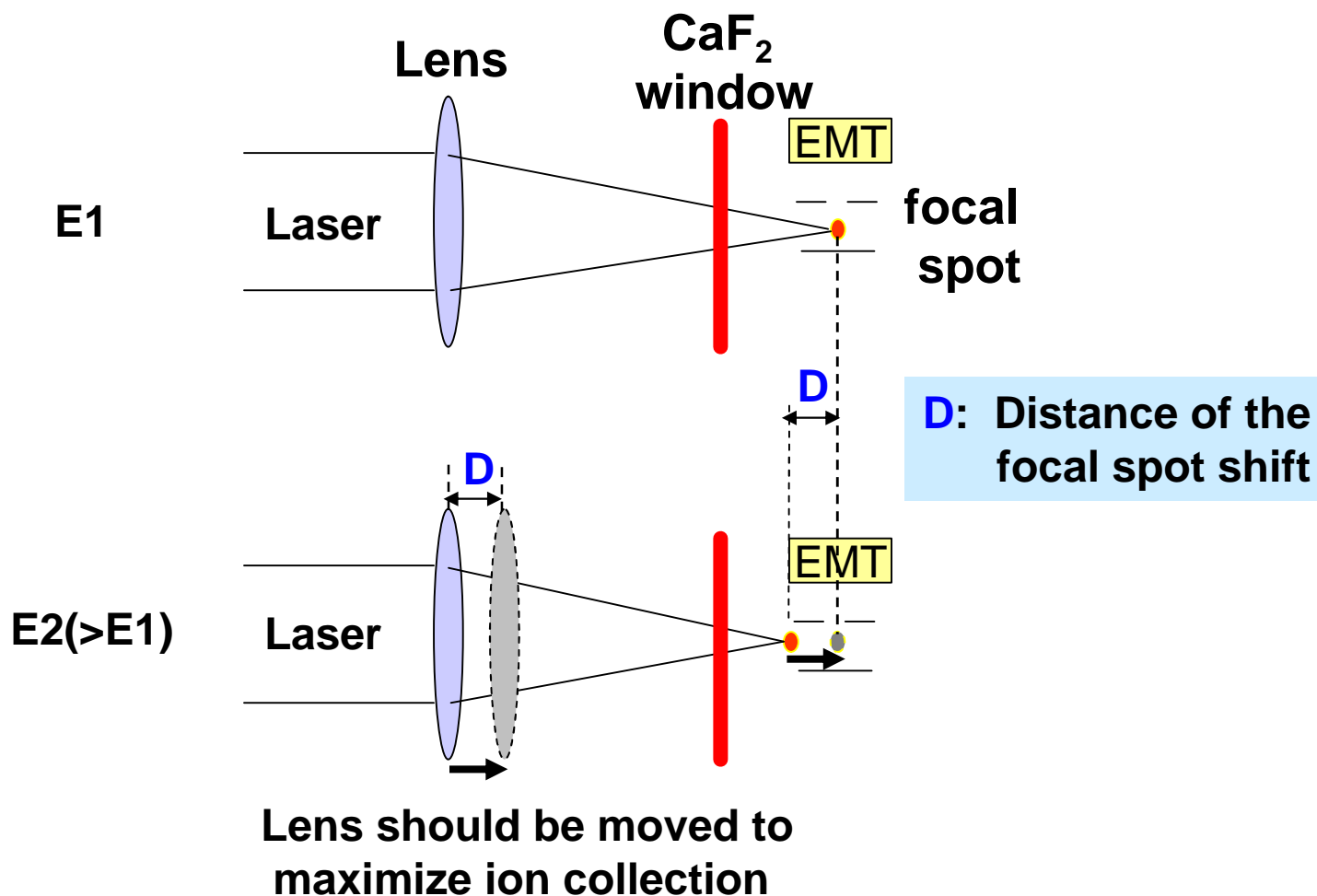
Time of Flight Mass Spectrometer (TOFMS)



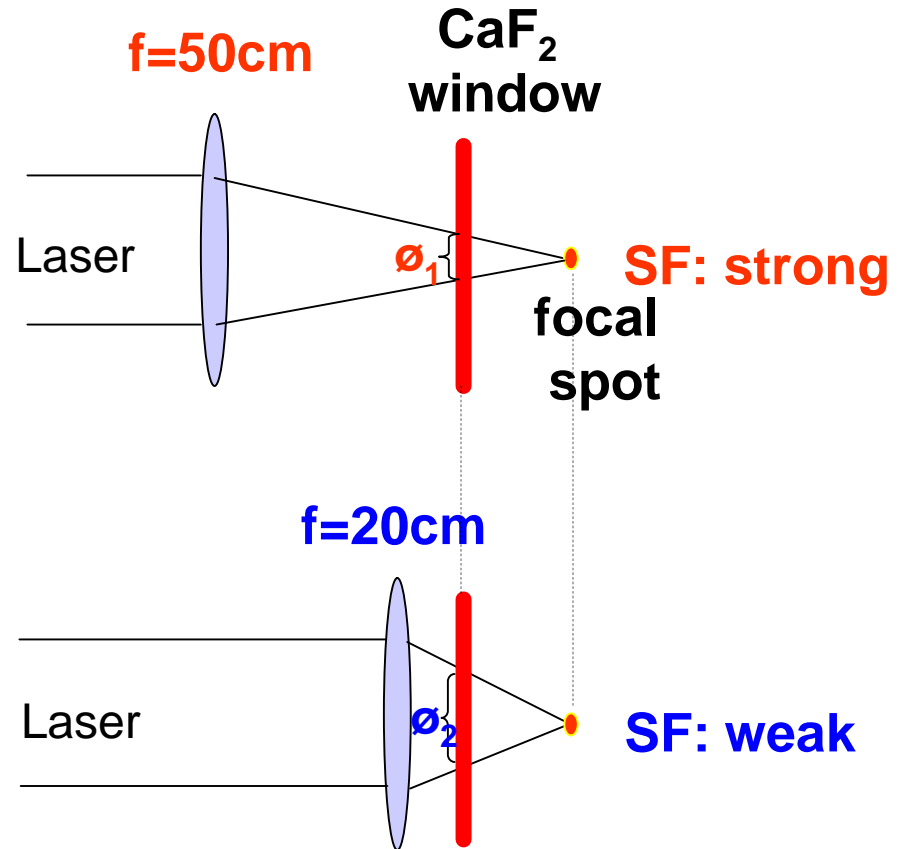
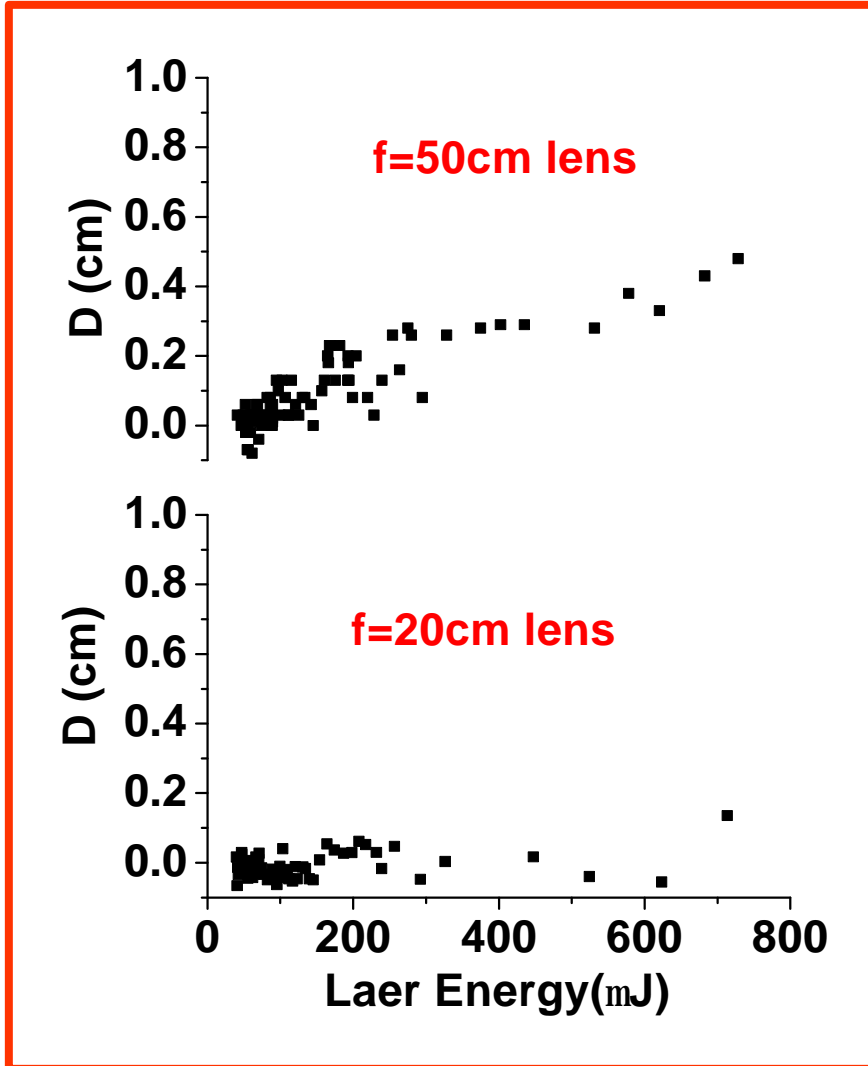
Ion yield is enhanced using $f=50\text{cm}$ lens compared to using $f=20\text{cm}$ lens

Self-focusing (SF) effect inside entrance window changes the beam distribution at interaction zone

Focal Spot Shifts with Increasing Laser Energy due to the SF Induced by Fused Silica Window

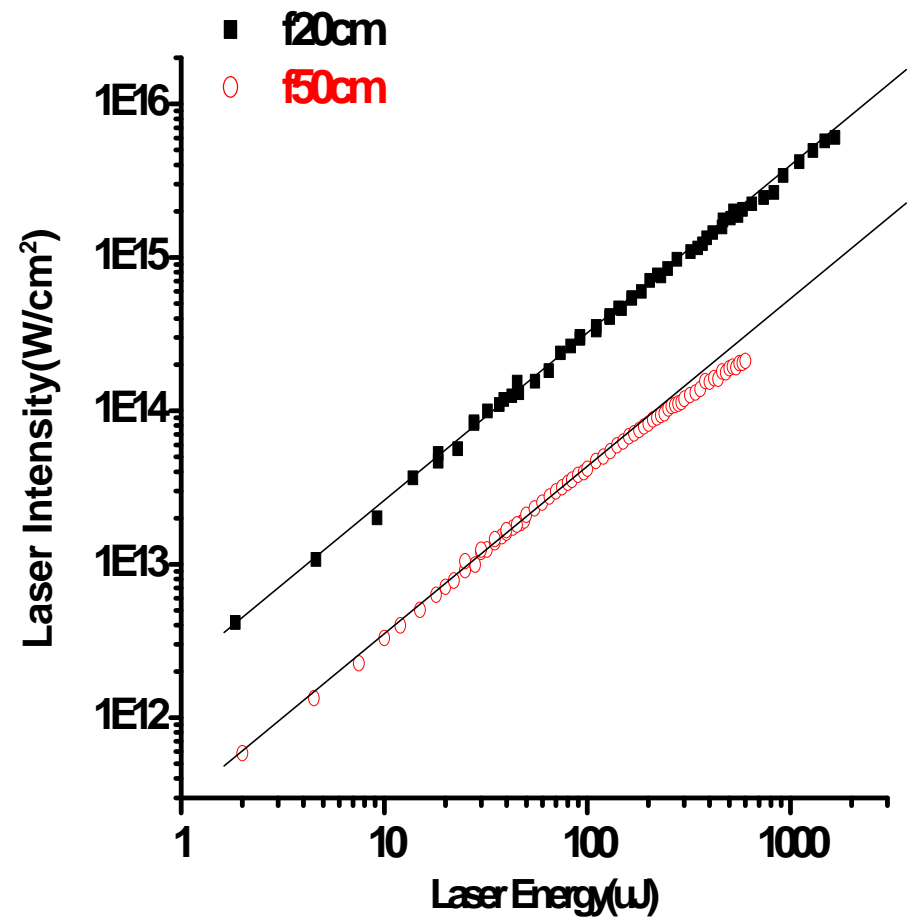
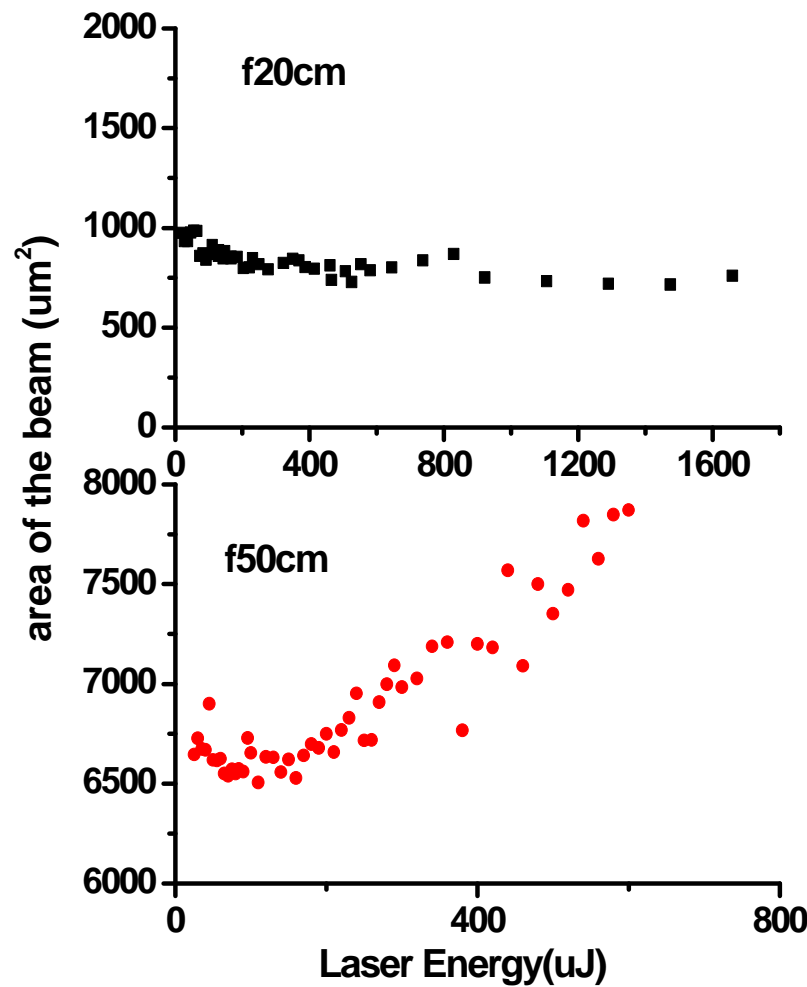


$f=50\text{cm}$ lens: Focal spot shifts more with increasing laser energy

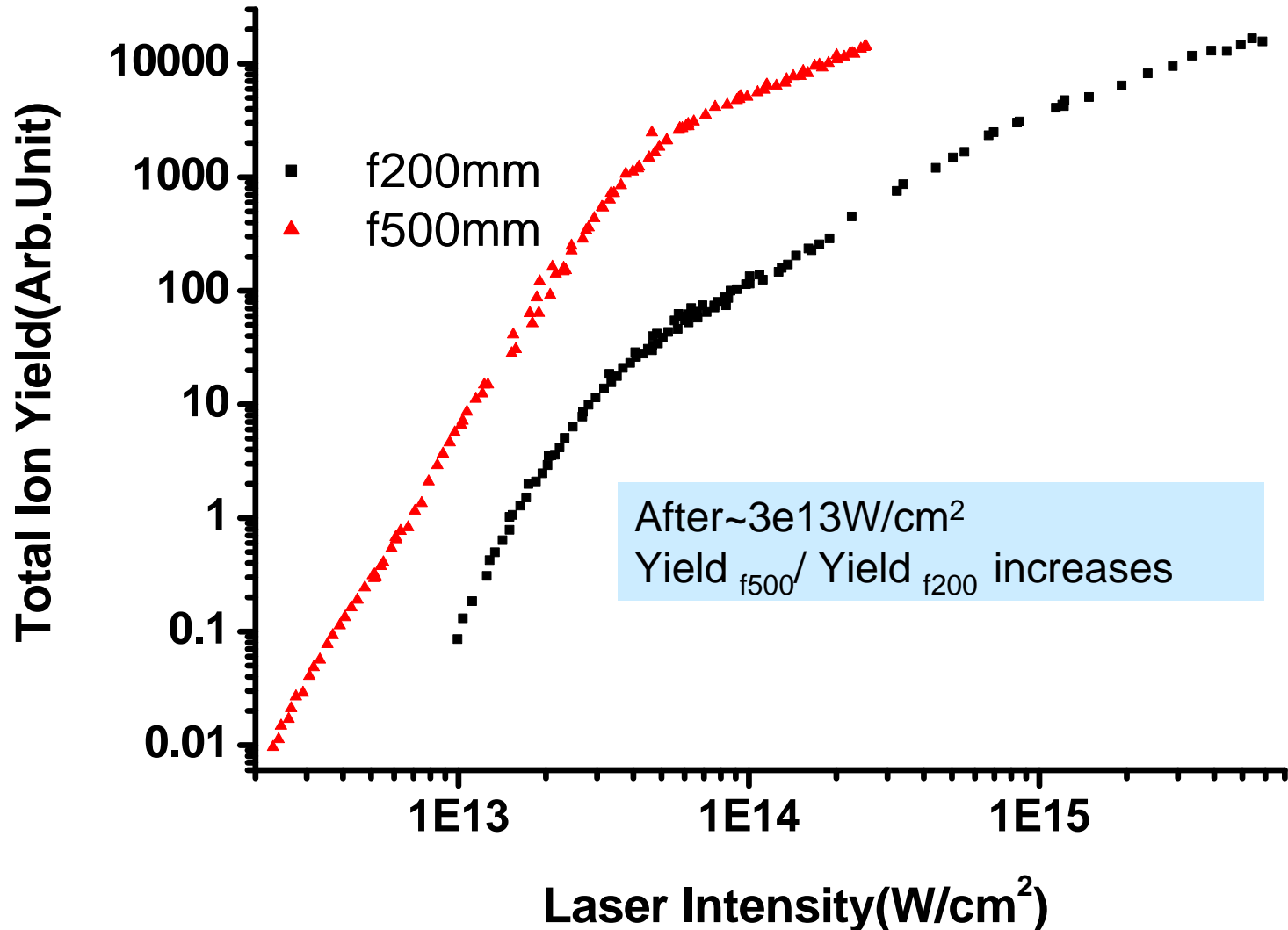


D: Distance of the focal spot shift (see slide 3)

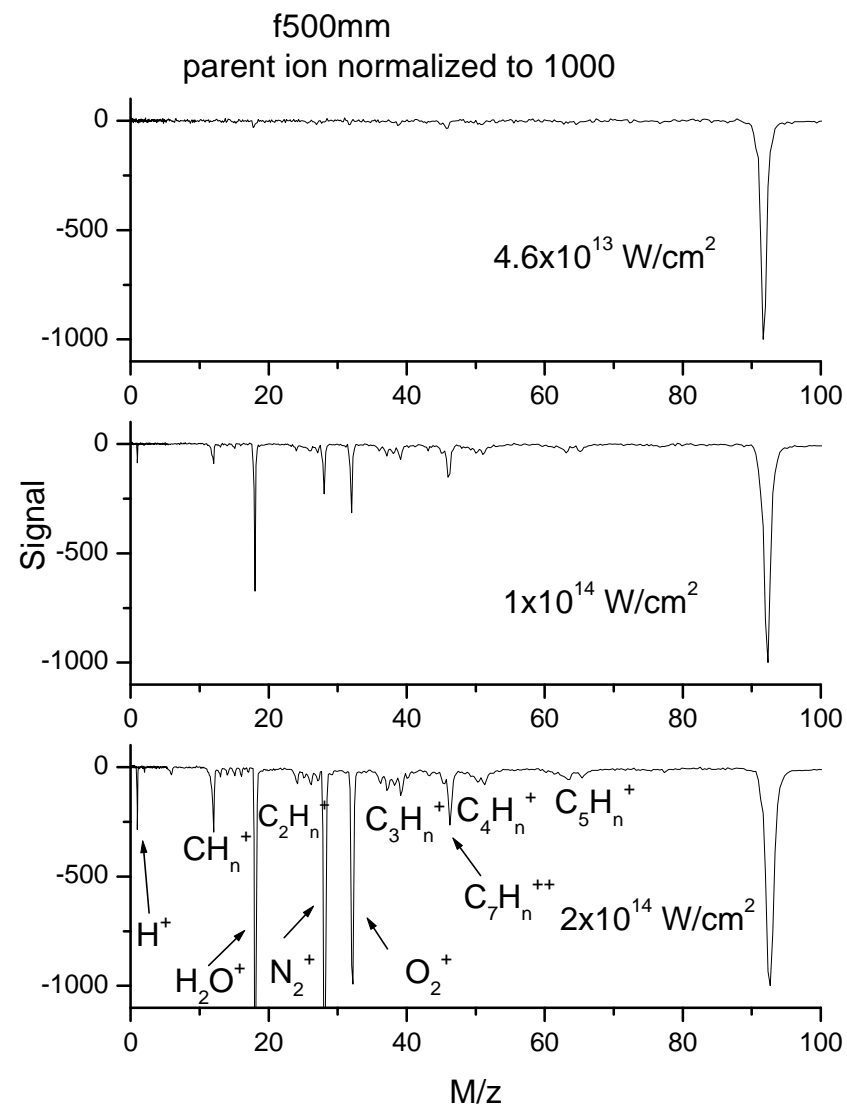
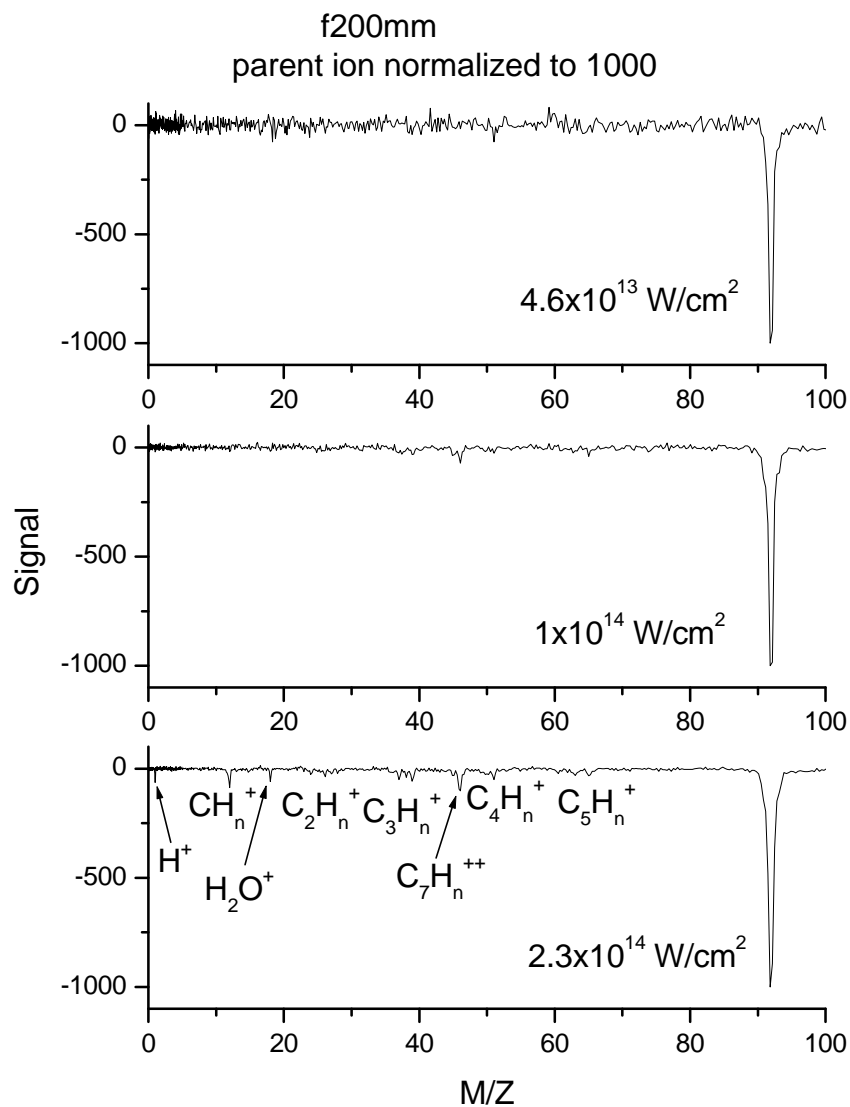
Focal Area Increase and Laser Intensity Decrease by Nonlinear Effect



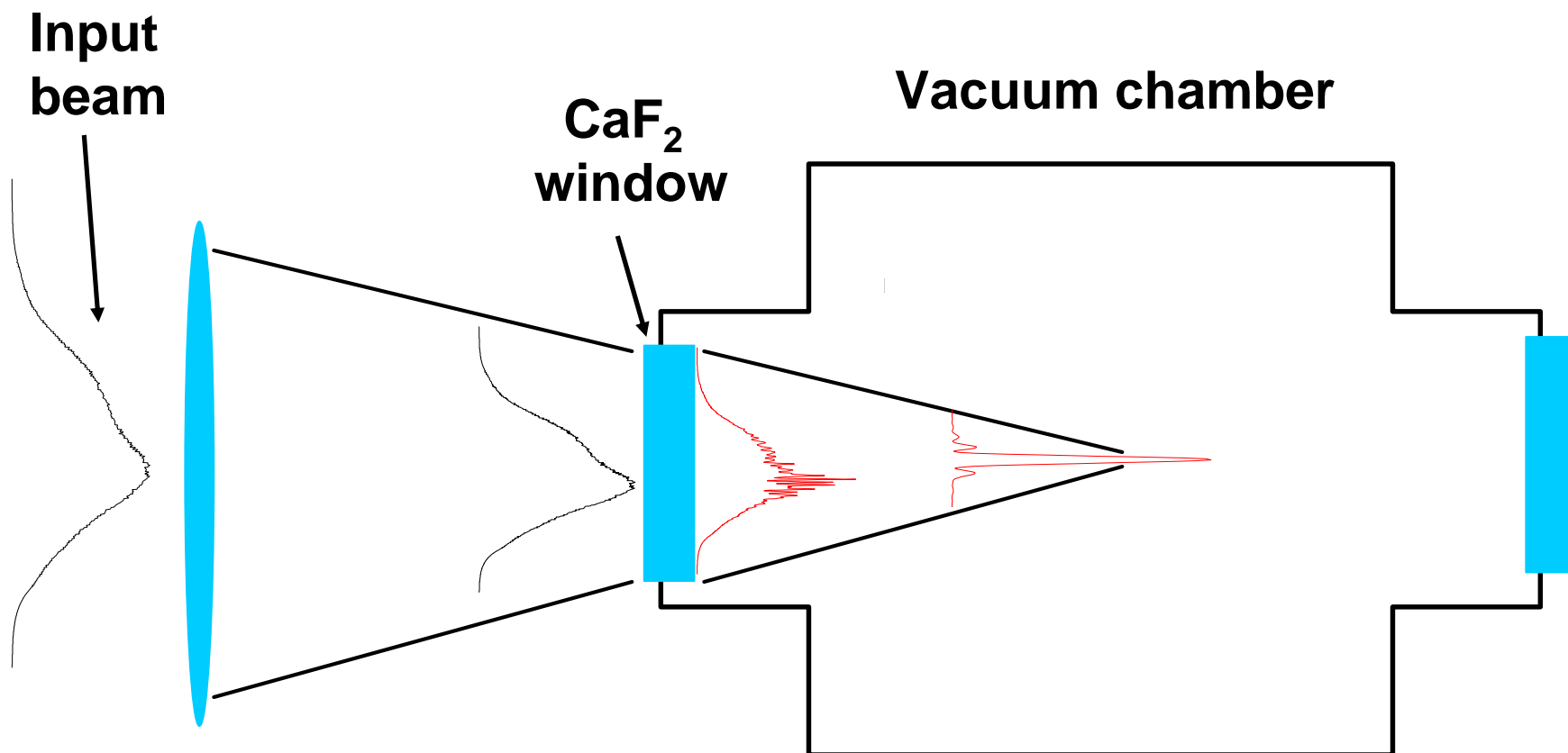
f=50cm lens gives more ion yield



f=50cm Lens Gives More Fragmentation



SF inside CaF_2 window changes beam distribution at the focus



The whole beam is focusing, while **hot spots are diffracting**.
The focal area is increasing with input pulse energy increase

Conclusion

Self-focusing (SF) in fused silica window can increase focal spot area, decrease the Laser intensity and enhance the ionization and fragmentation of toluene

Acknowledgements

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