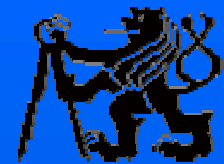


Czech Technical University in Prague
Faculty of Nuclear Sciences and Physical Engineering



**COMPARATIVE UV DIAGNOSTICS STUDIES
OF LASER GENERATED PLASMA VS
ELECTRICAL DISCHARGE PLASMA IN
EVACUATED POLYETHYLEN CAPILLARY**

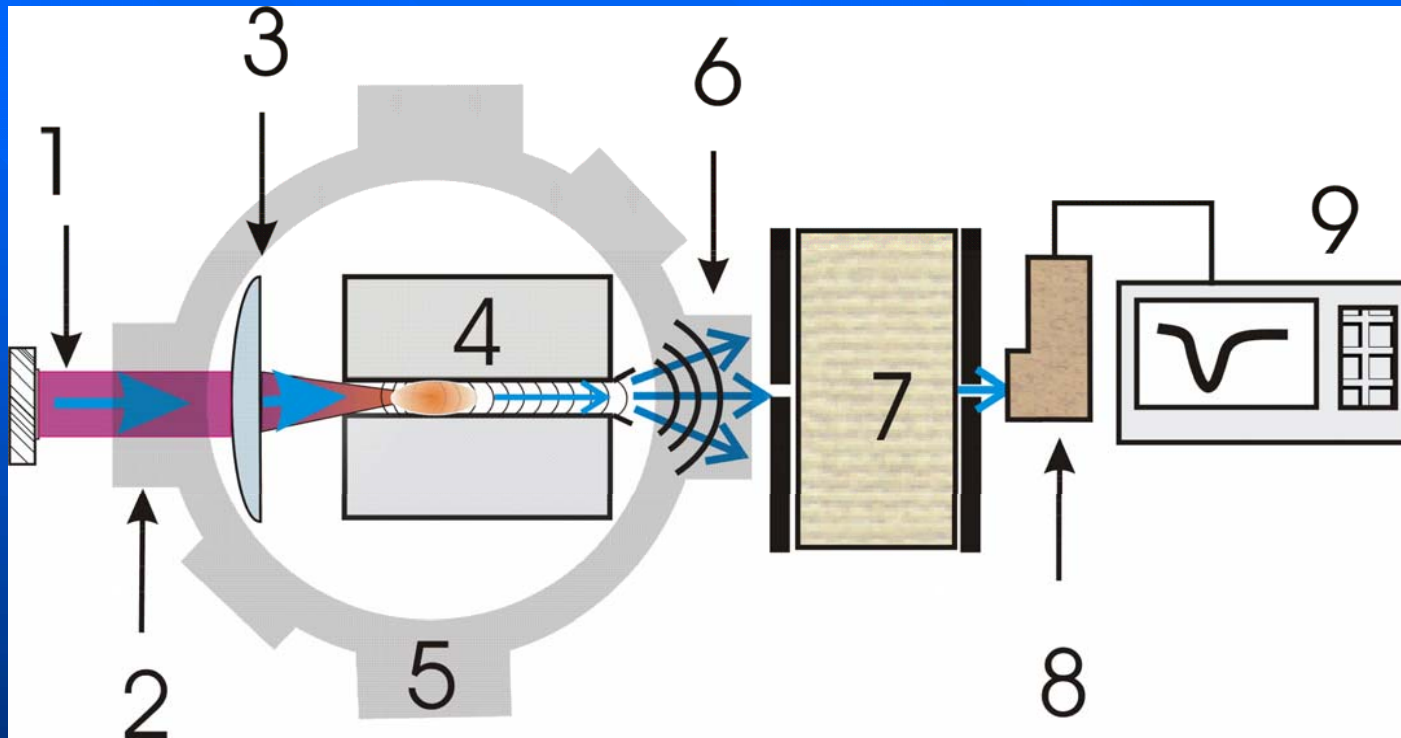
A. Fojtík, S. Palínek, M. Vrbová

Prague 2004

Motivation

- Understand the dynamics of laser generated plasma in capillary
- Perform the time-resolved UV diagnostics of the radiation emitted by this plasma
- Compare the results with the spectra emitted by a fast electric discharge

Experimental set-up



Energy density:

$< 10e14 \text{ W/cm}^2$

1-laser beam, 2-glas window, 3- quartz lens, 4-
polyethylen capillary, 5-vacuum chamber, 6-
quartz window, 7-grating monochromator, 8-
photomultiplier tube, 9-oscilloscope

Experimental set-up

Capillary - white polyethylene



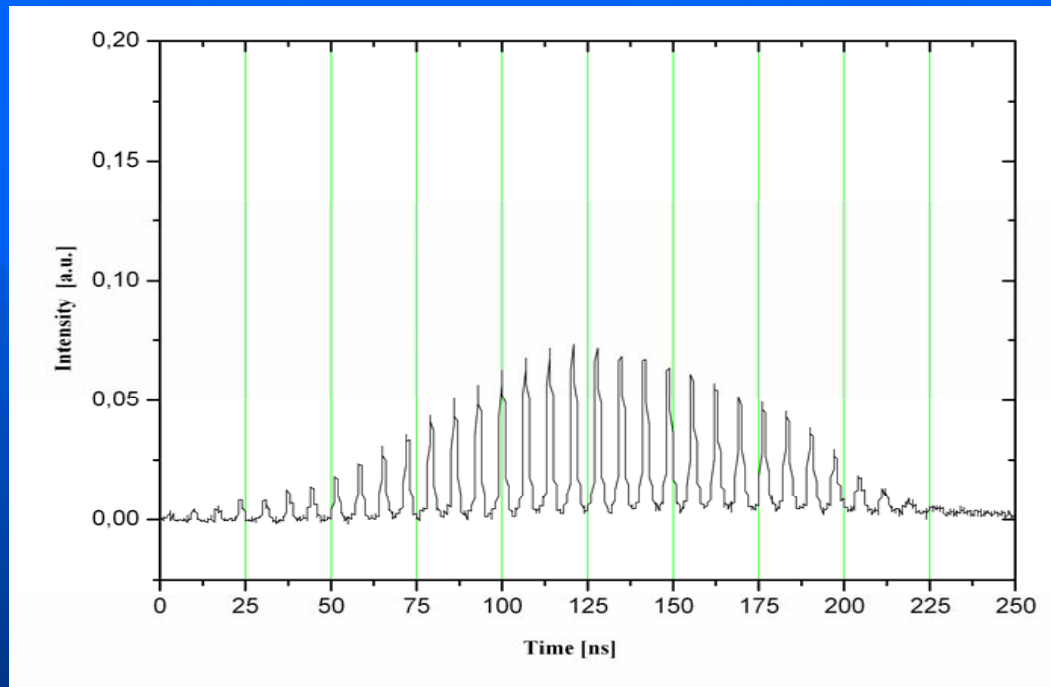
- 1.1 mm in inner diameter
- several cm in length.

Vacuum chamber



- pumped up to 10^{-5} Pa (3.10^{-7} torr)

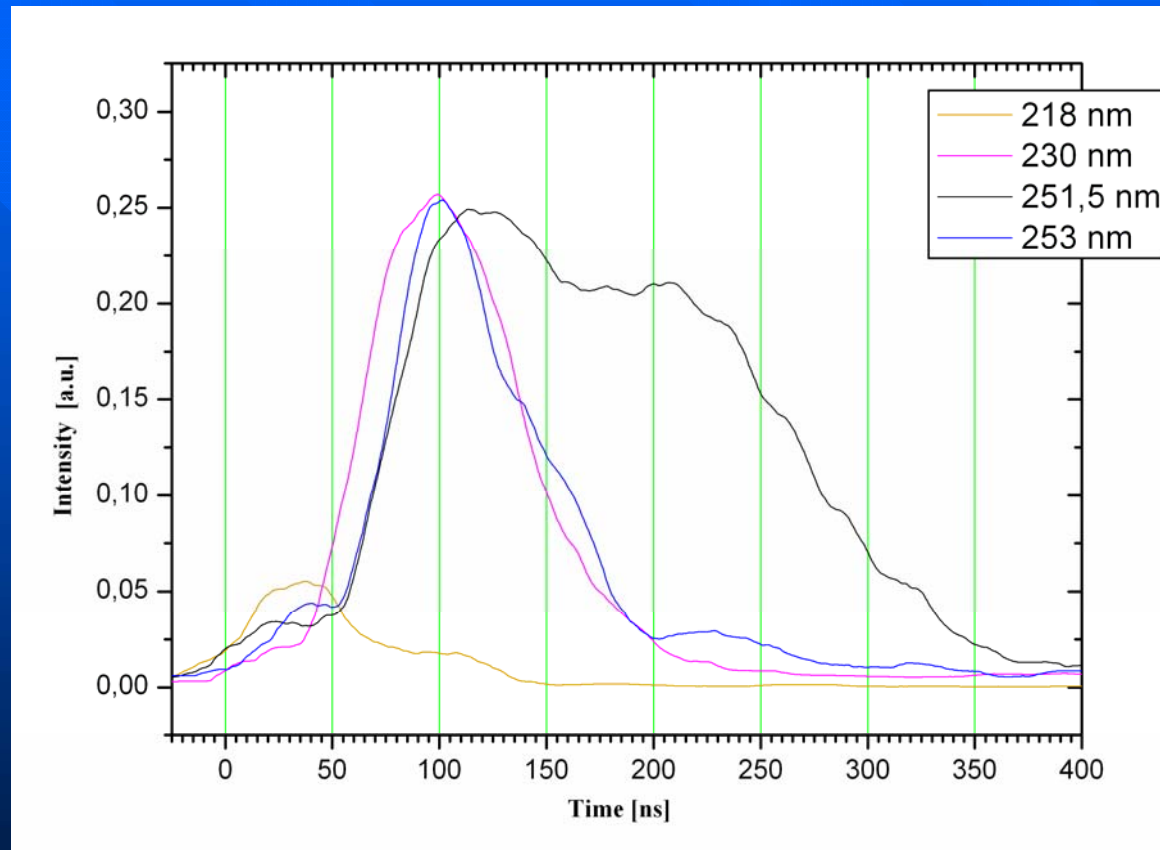
Laser pulse train



Ruby laser beam:

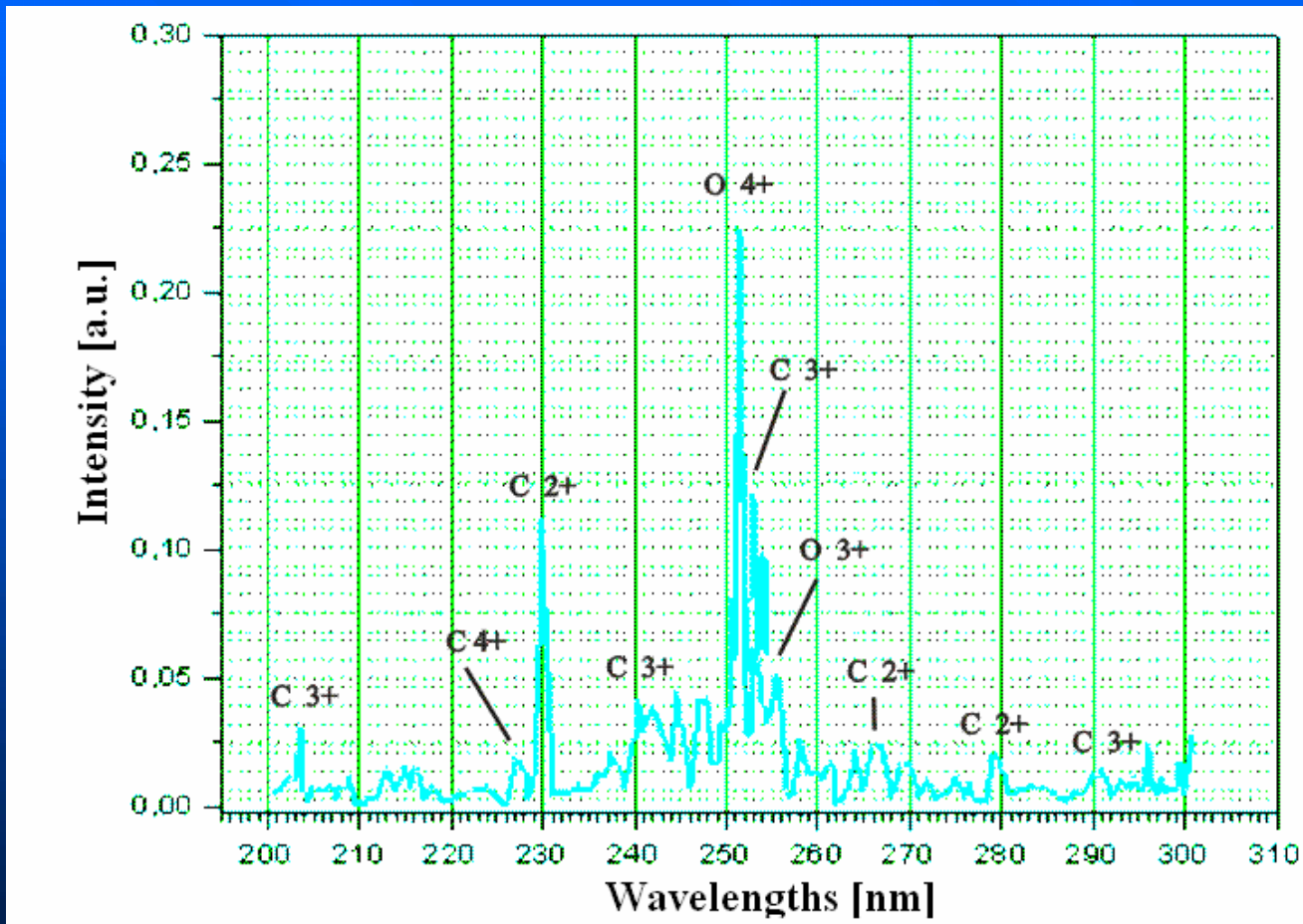
- passive mode-locking regime
- $\lambda = 694 \text{ nm}$
- energy of the pulse - 600 mJ

Waveform of the selected lines



graphs of intensity profiles as functions of time

Experimental results

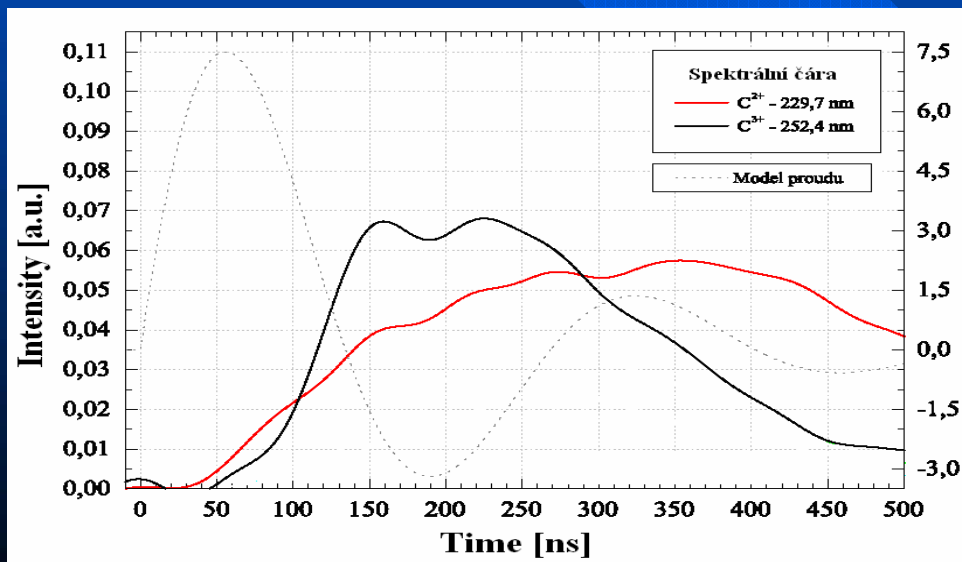
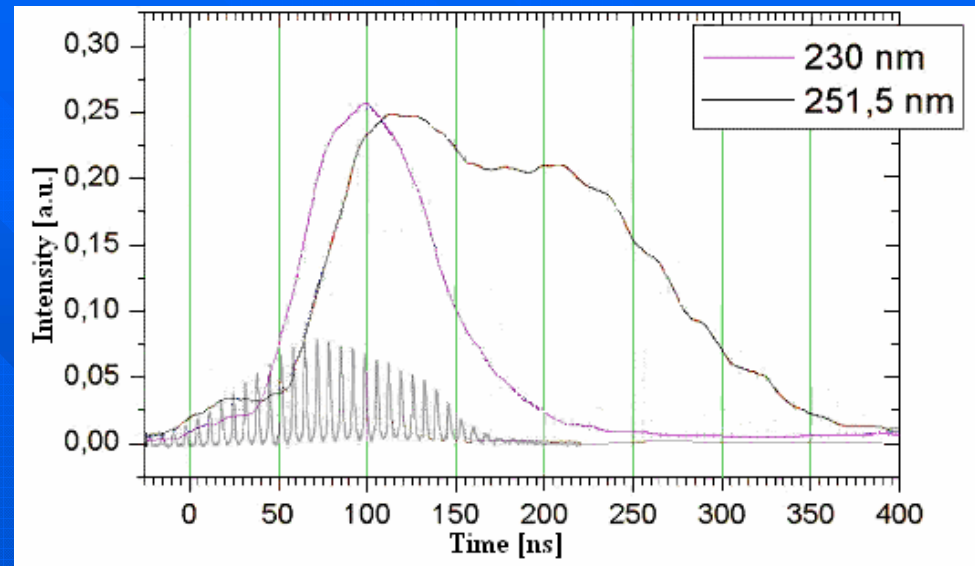


Delay:
150 ns

graphs of intensity profiles as functions of wavelength

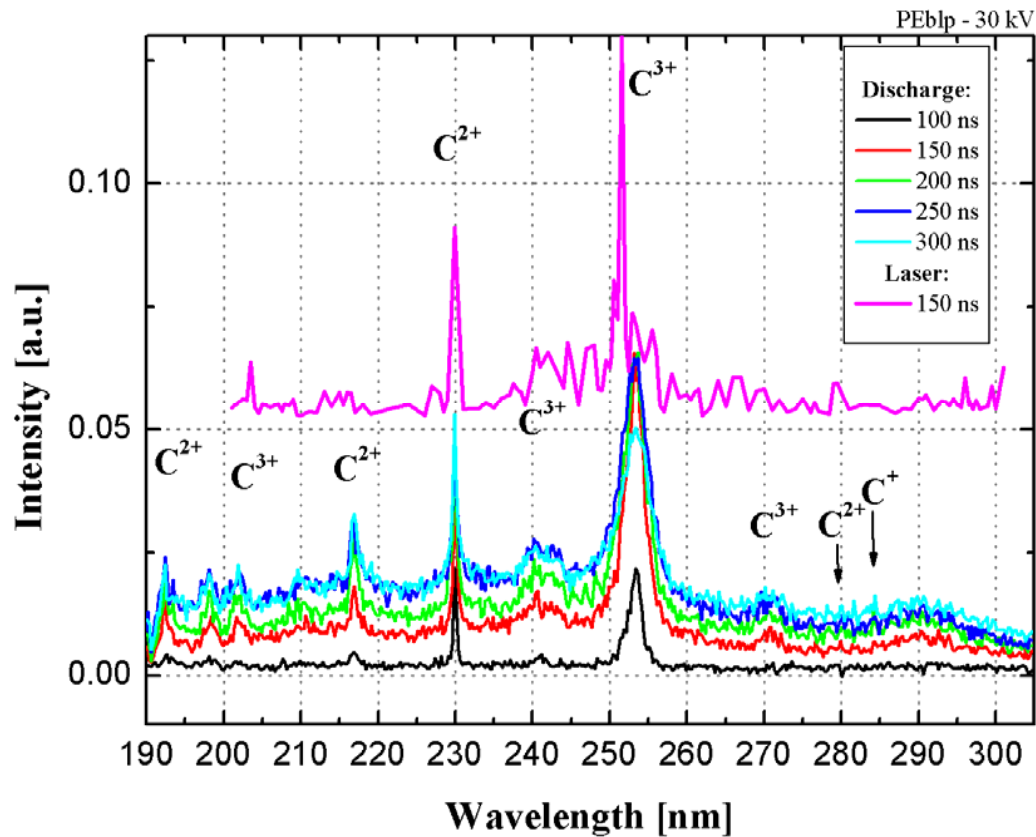
Graphs of intensity profiles

- graphs of intensity profiles in case of laser produced plasma



- graphs of intensity profiles in case of electrical discharge capillary plasmas

Comparative graphs



Case of:

- capillary plasmas
(5 bottom lines)
- laser produced plasma
(the upper line)

Comparative graphs of intensity profiles as functions of wavelength

Conclusion

- We have built an experimental system dedicated to this purpose
- We have measured the time-resolved spectrum in the range between 200 and 300 nm
- Most of the energy peaks belong to the same energy levels and transitions

Thank you for your attention