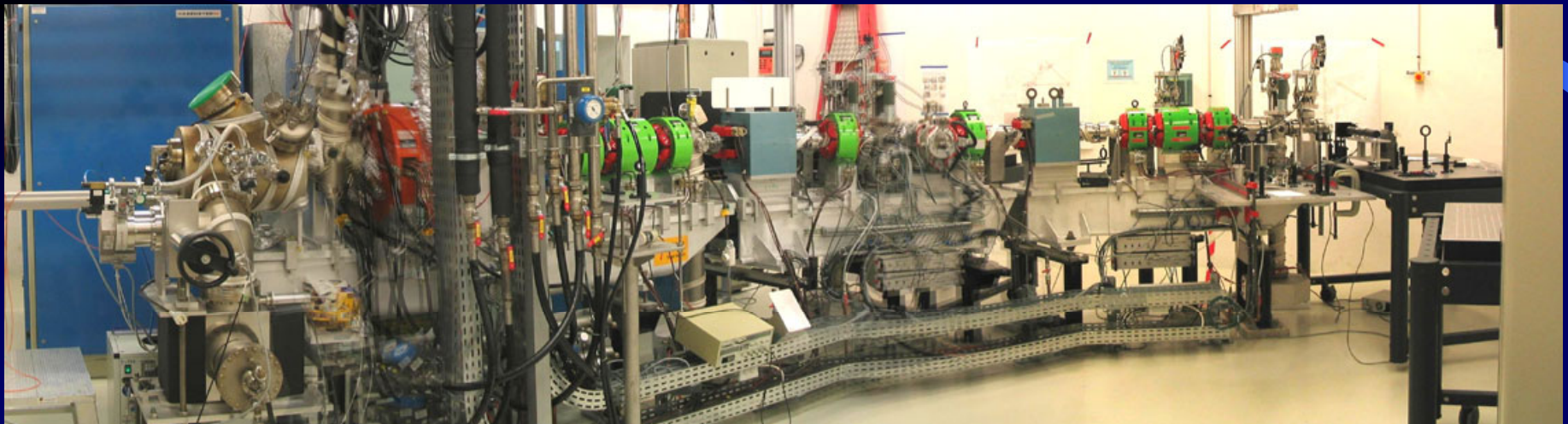


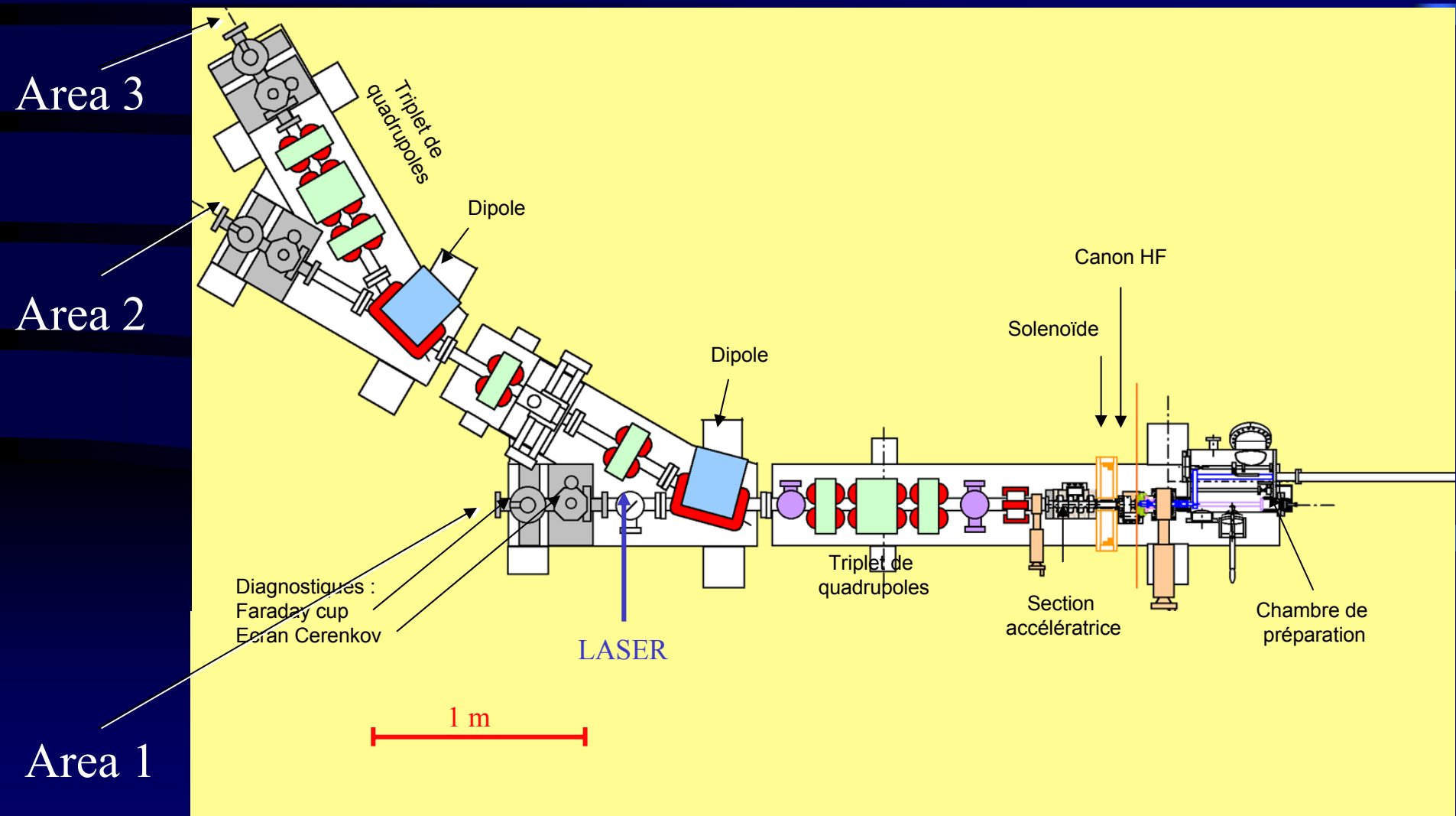
# The first experiments on ELYSE picosecond electron accelerator

J.L. Marignier, V. De Waele,  
H. Monard, J.P. Larbre, M. Mostafavi and J. Belloni

Laboratoire de Chimie Physique - Orsay - FRANCE



# ELYSE experimental areas

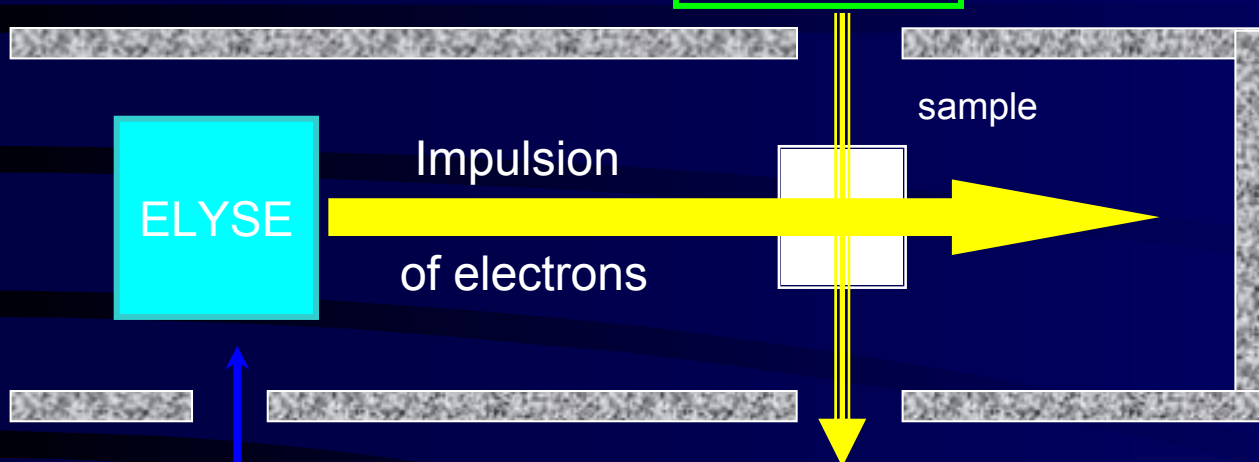


# Area 1 : transient absorption

Bunker

Analyzing light

- Laser Diode
- Lamp



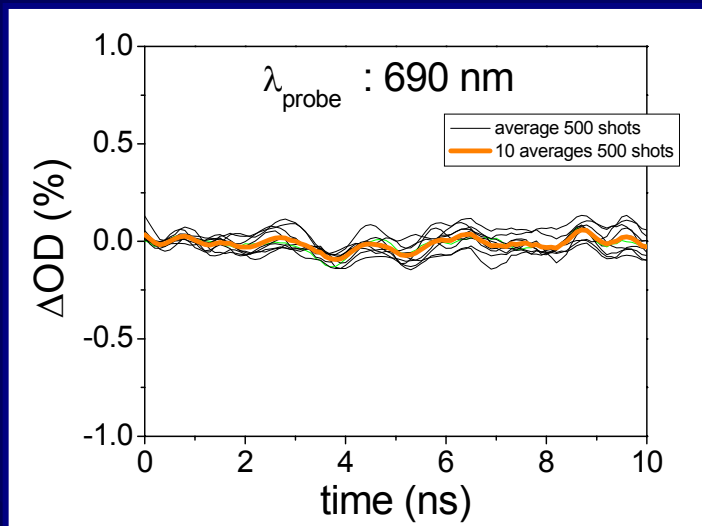
Laser  
266 nm  
2ps

PD

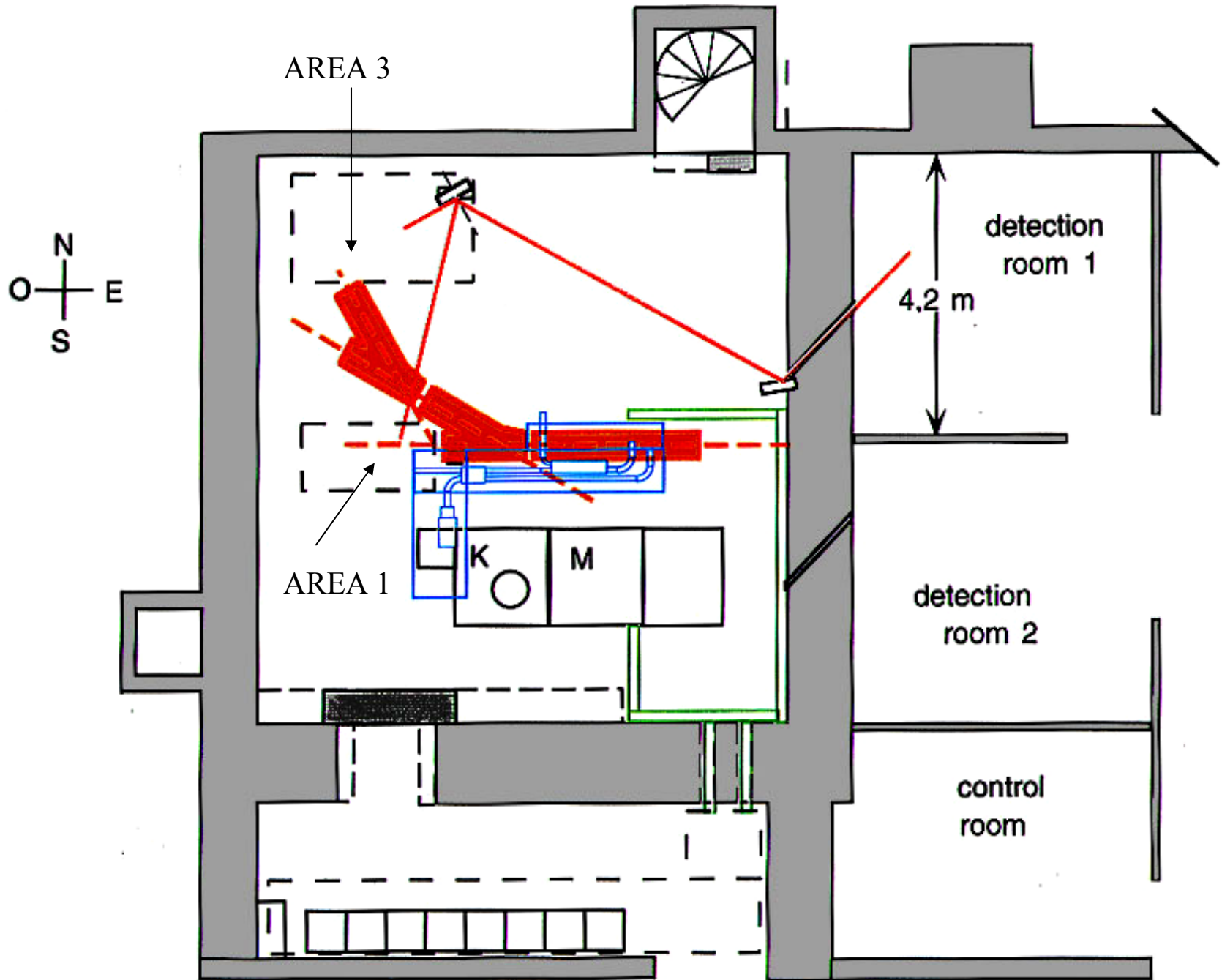
Fast detection  
• Photodiode  
• PM

Digital  
Oscilloscope  
(>Ghz)

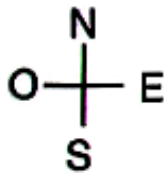
Synchronization



sensitivity  $\ll 1\% \text{ OD}$



AREA 3



detection room 1

4.2 m

AREA 1

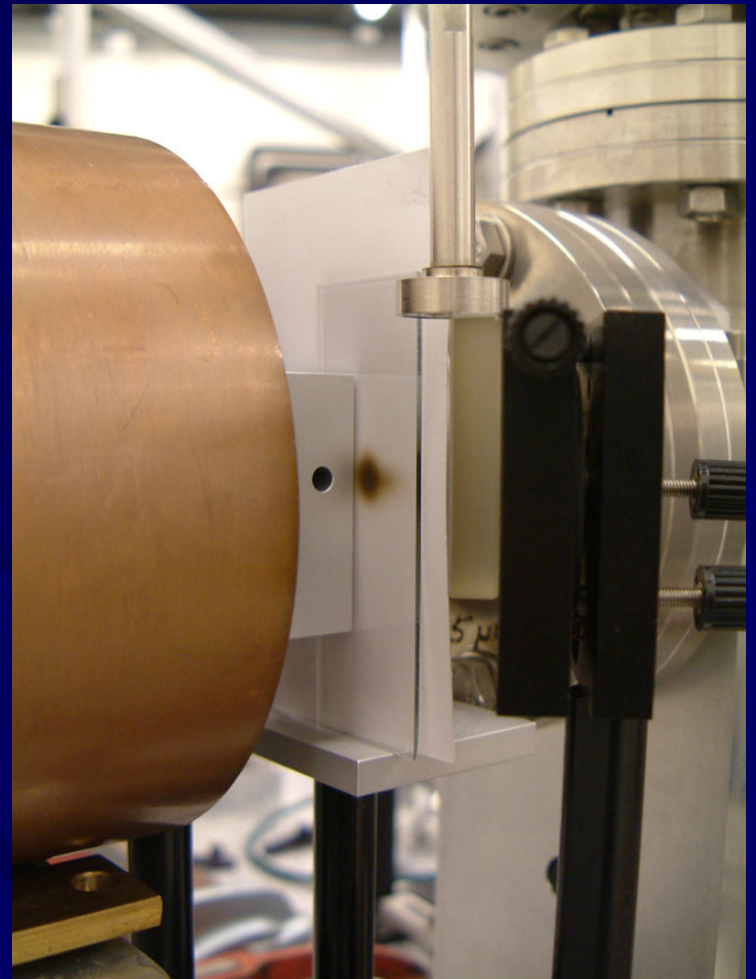
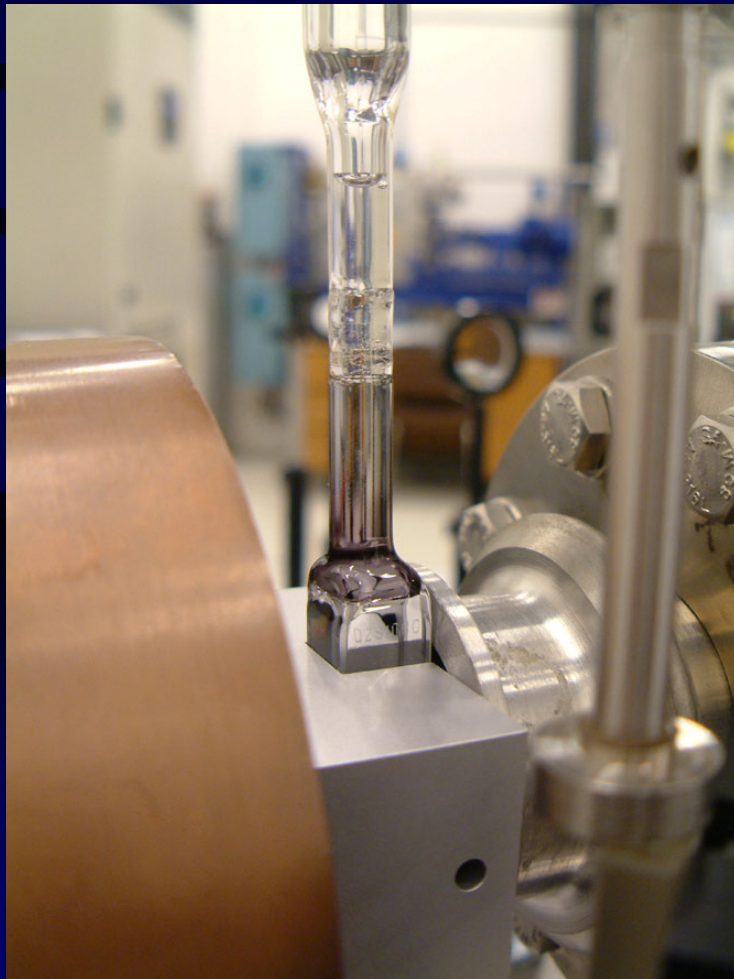
K

M

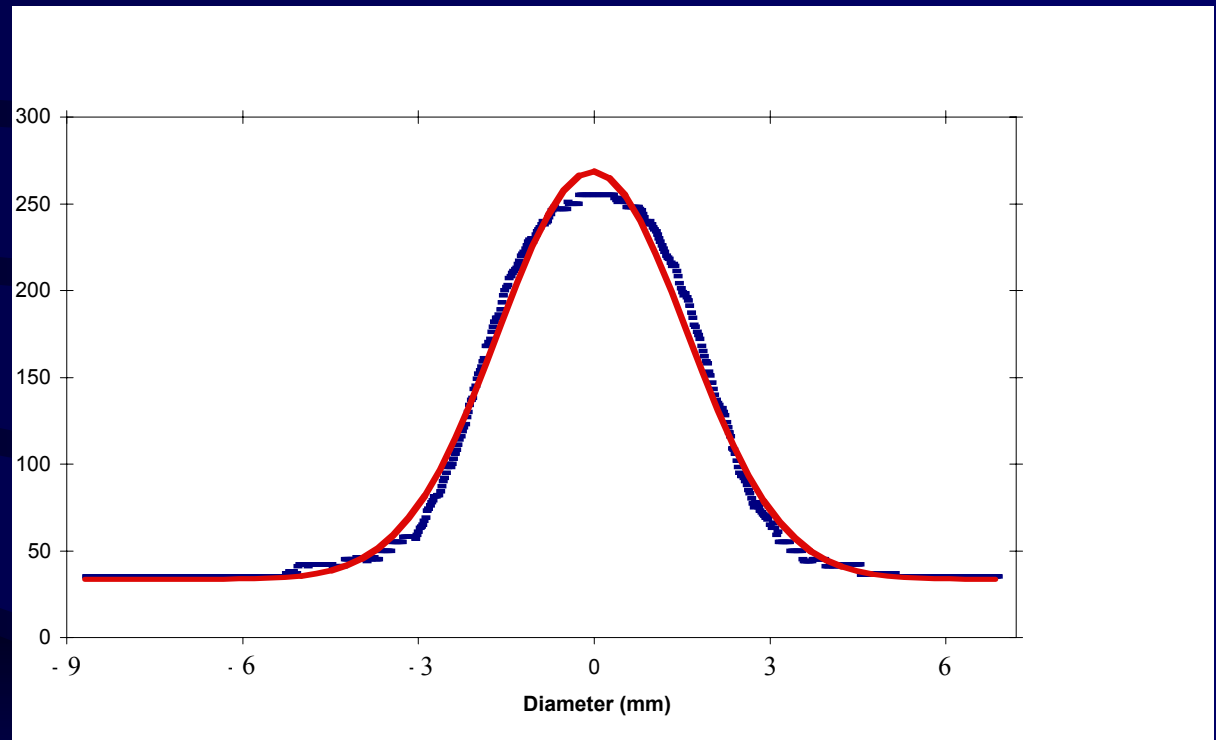
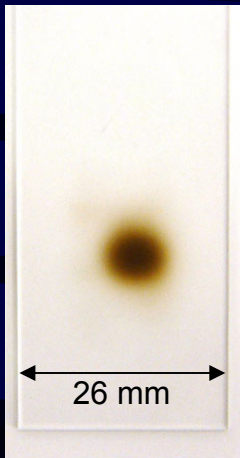
detection room 2

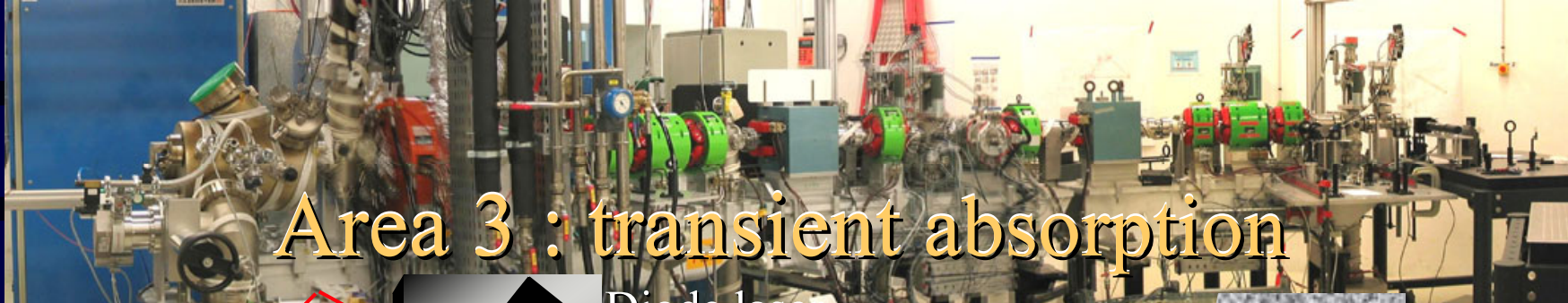
control room

# Area 3

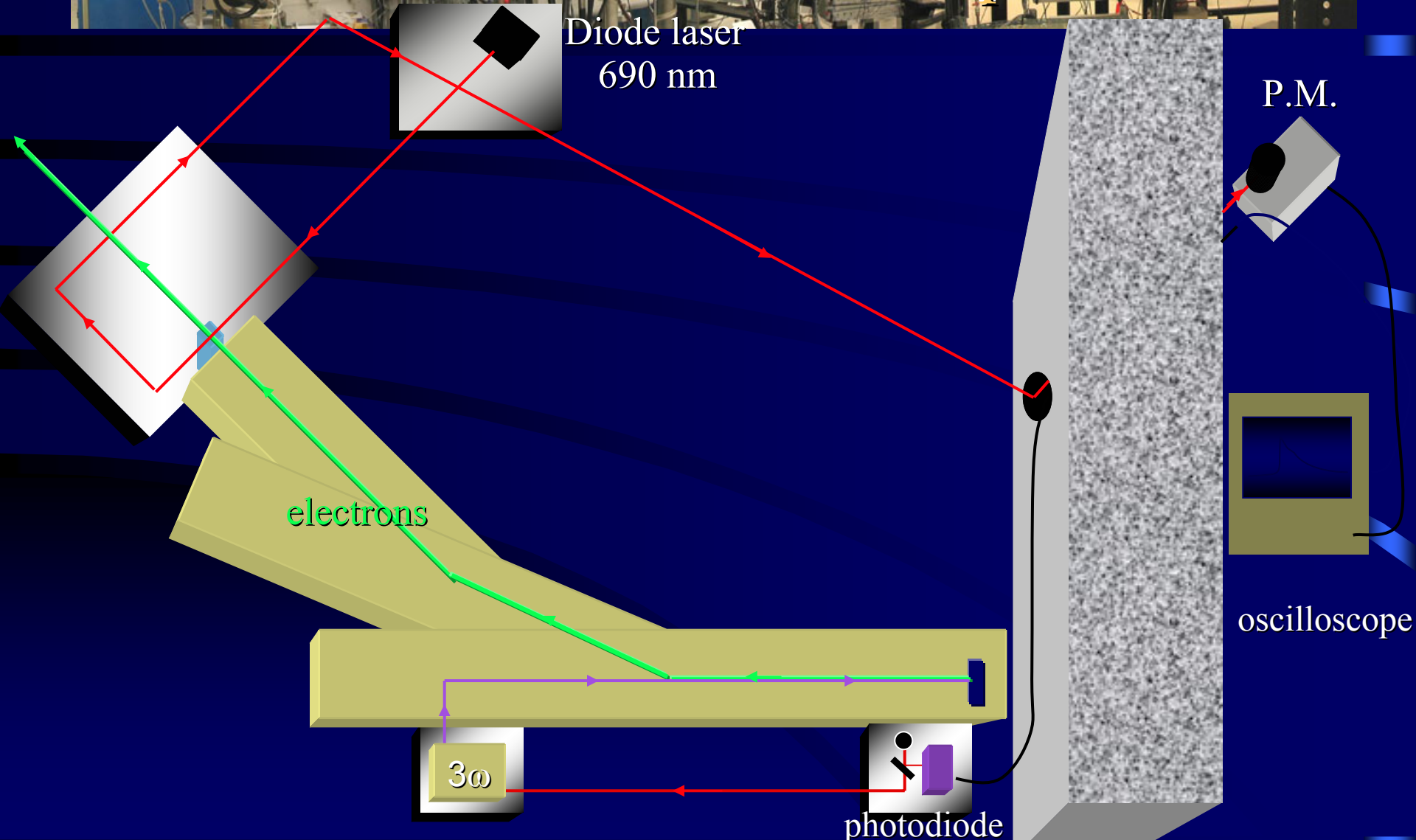


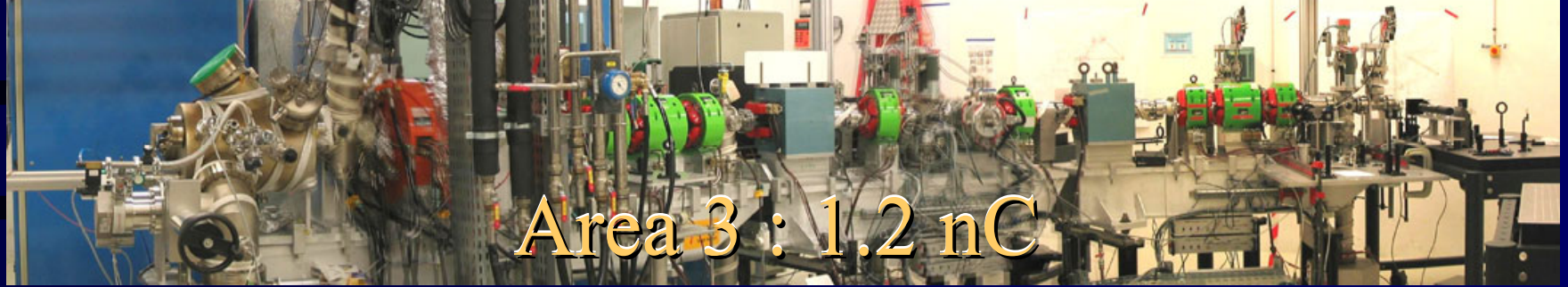
# Area 3 : electron beam on the cell





# Area 3 : transient absorption





Analyzing light :  
Pulsed laser diode at

$$\lambda = 690 \text{ nm}$$

Detector : P.M.





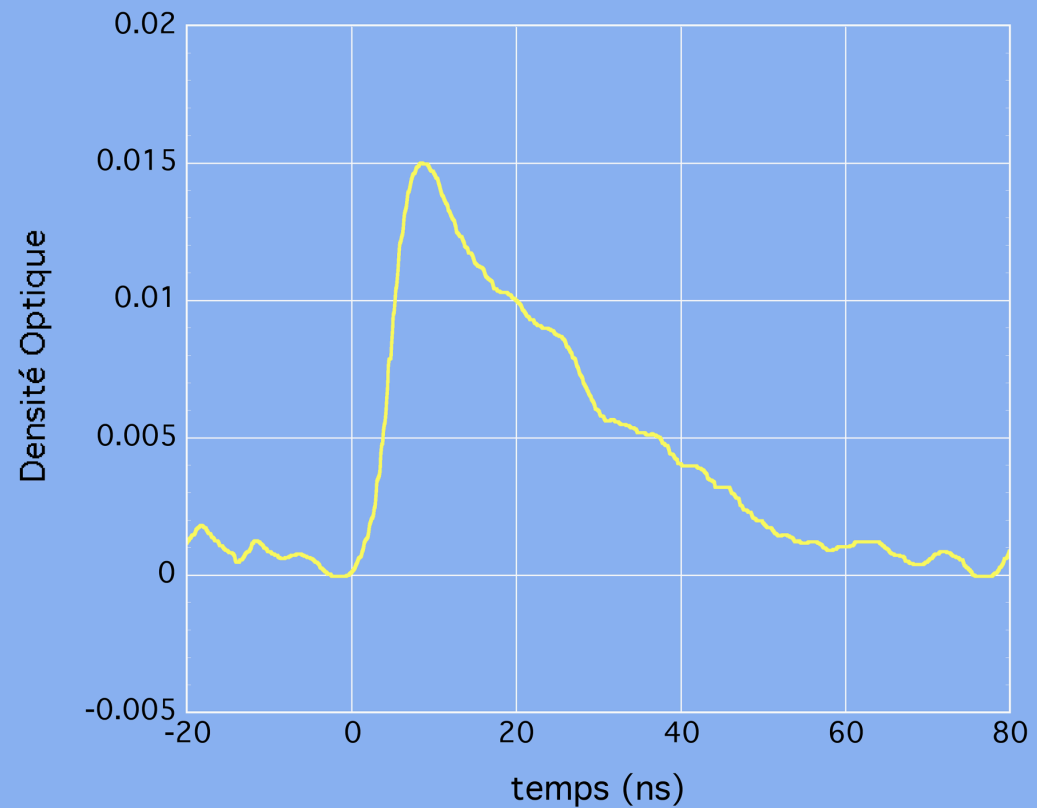


Area 3 : 1.2 nC

Analyzing light :  
Pulsed laser diode at

$\lambda = 690 \text{ nm}$

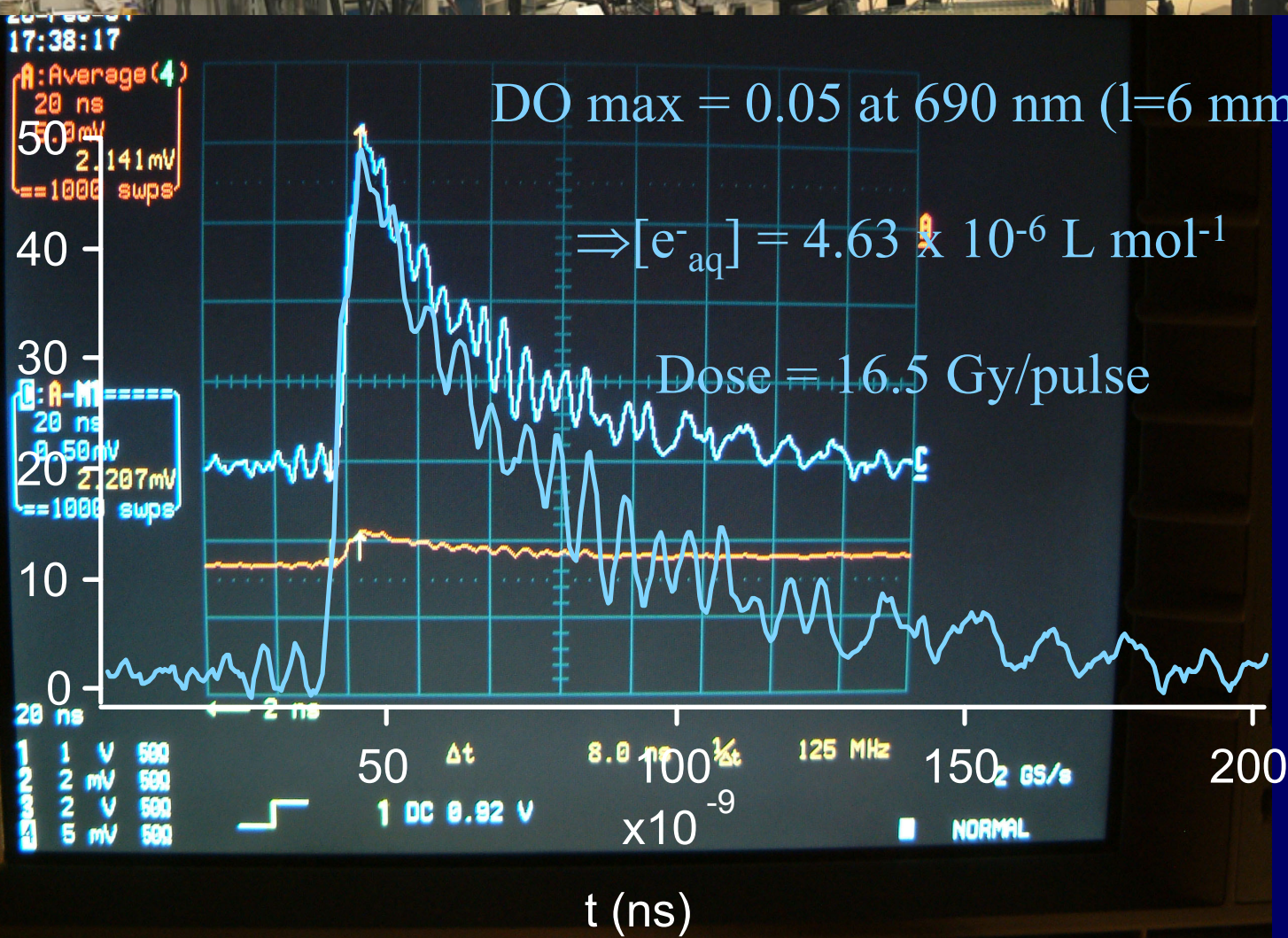
Detector : P.M.

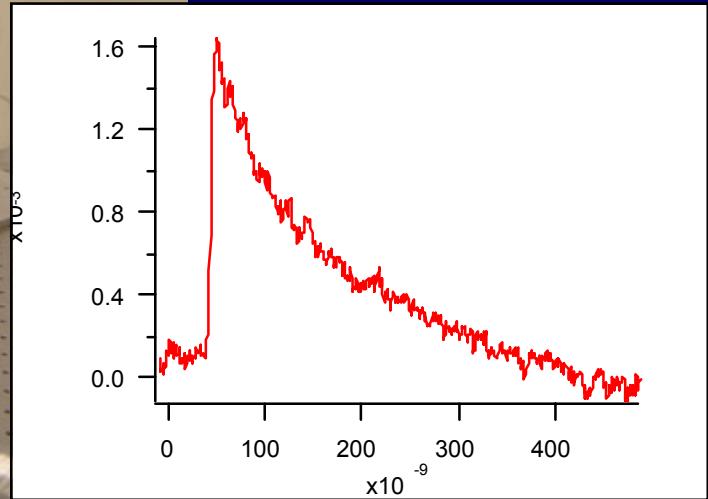
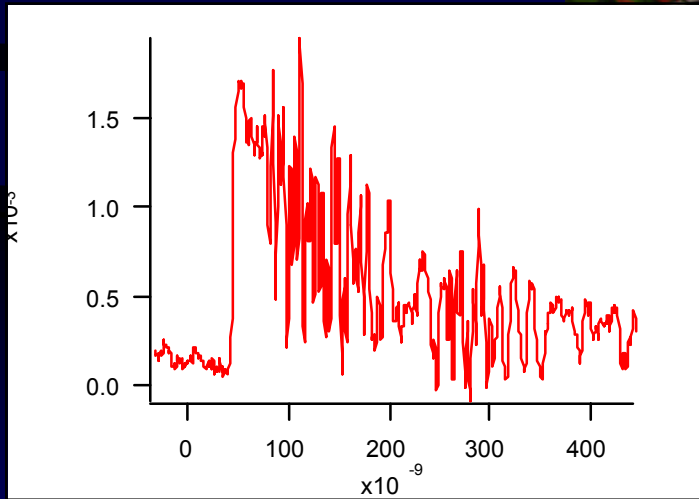
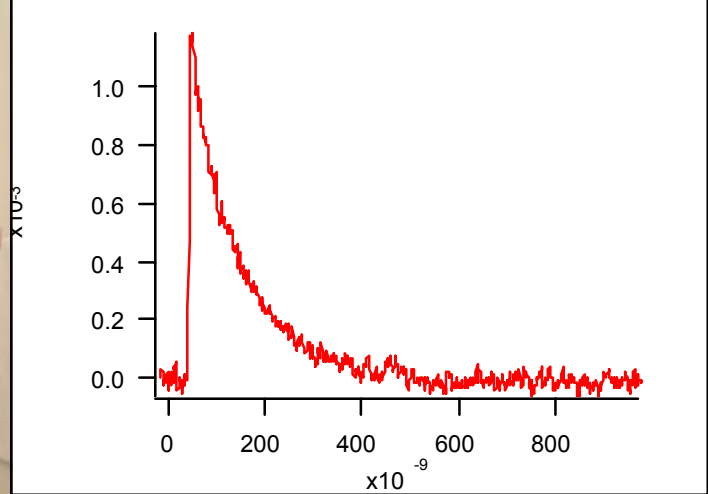
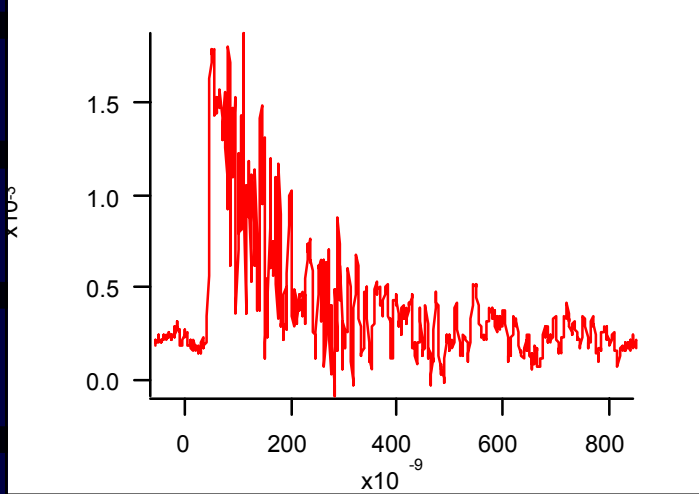


Area 3 : 2.1 nC

Densité Optique

$\times 10^{-3}$



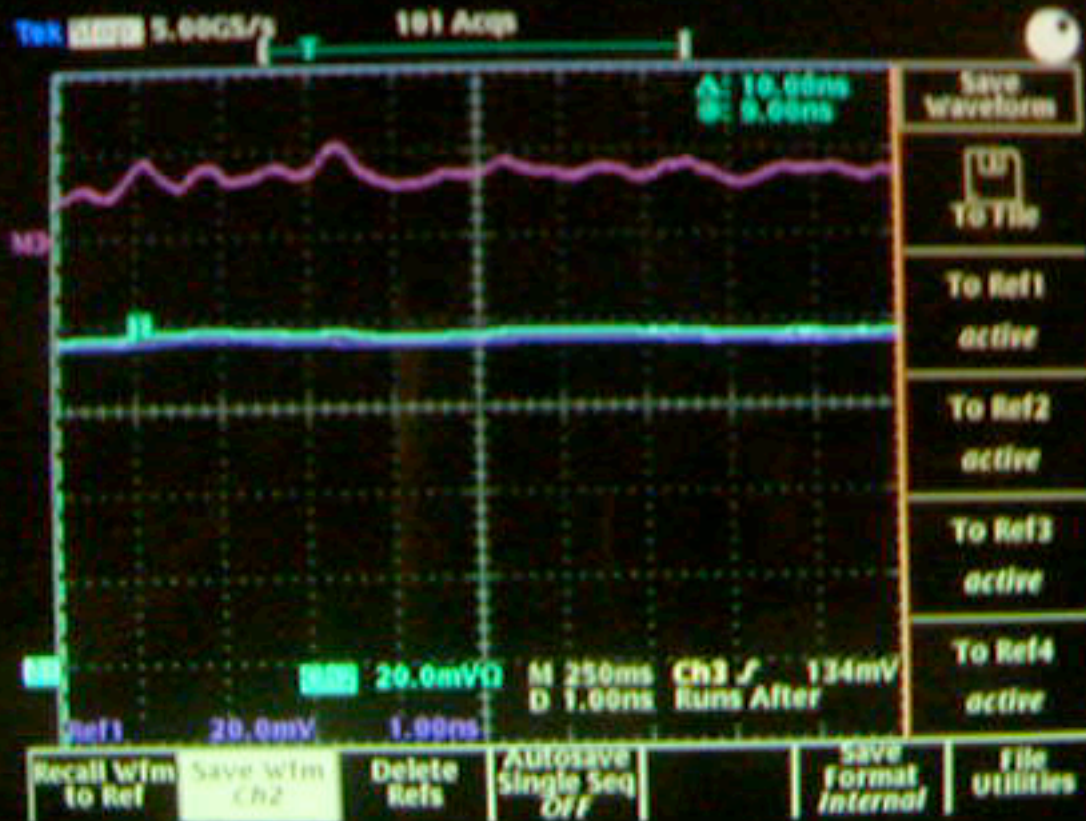


Without Faraday cage

With Faraday cage

Analyzing light : Pulsed laser diode at 658 nm

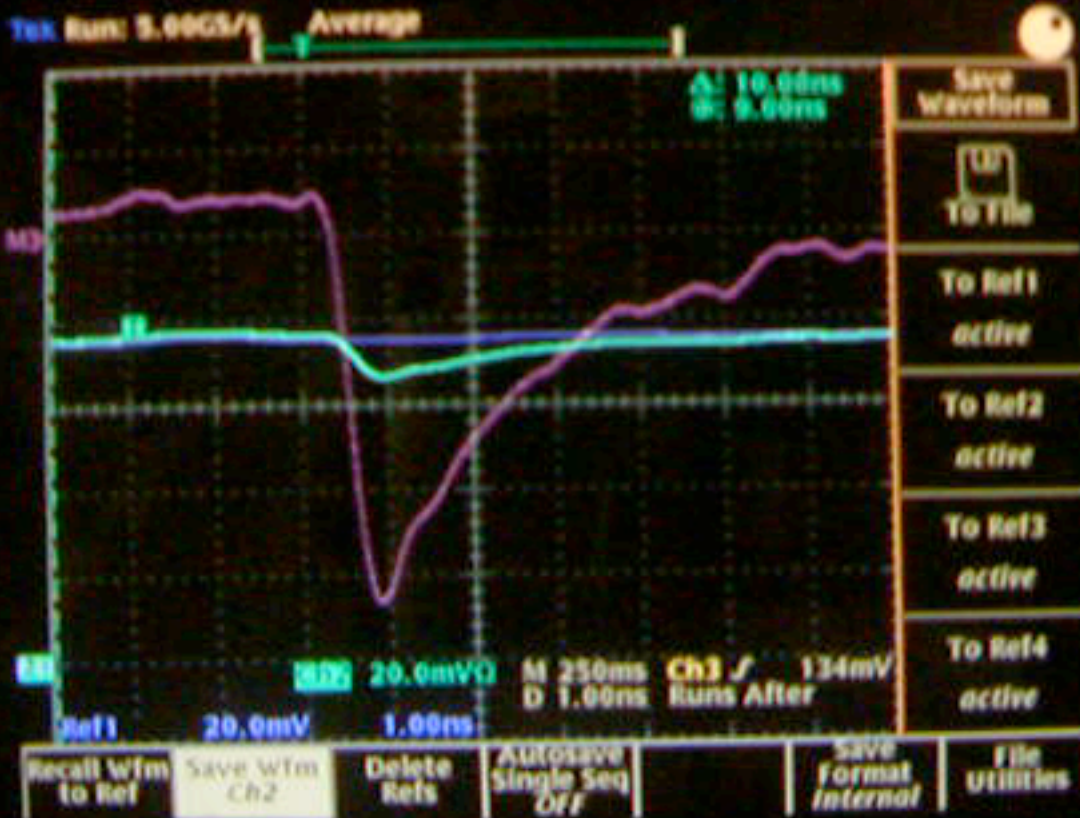
Detector : Fast Si photo-diode (200 ps time rise)



10 ns full scale

tektronix

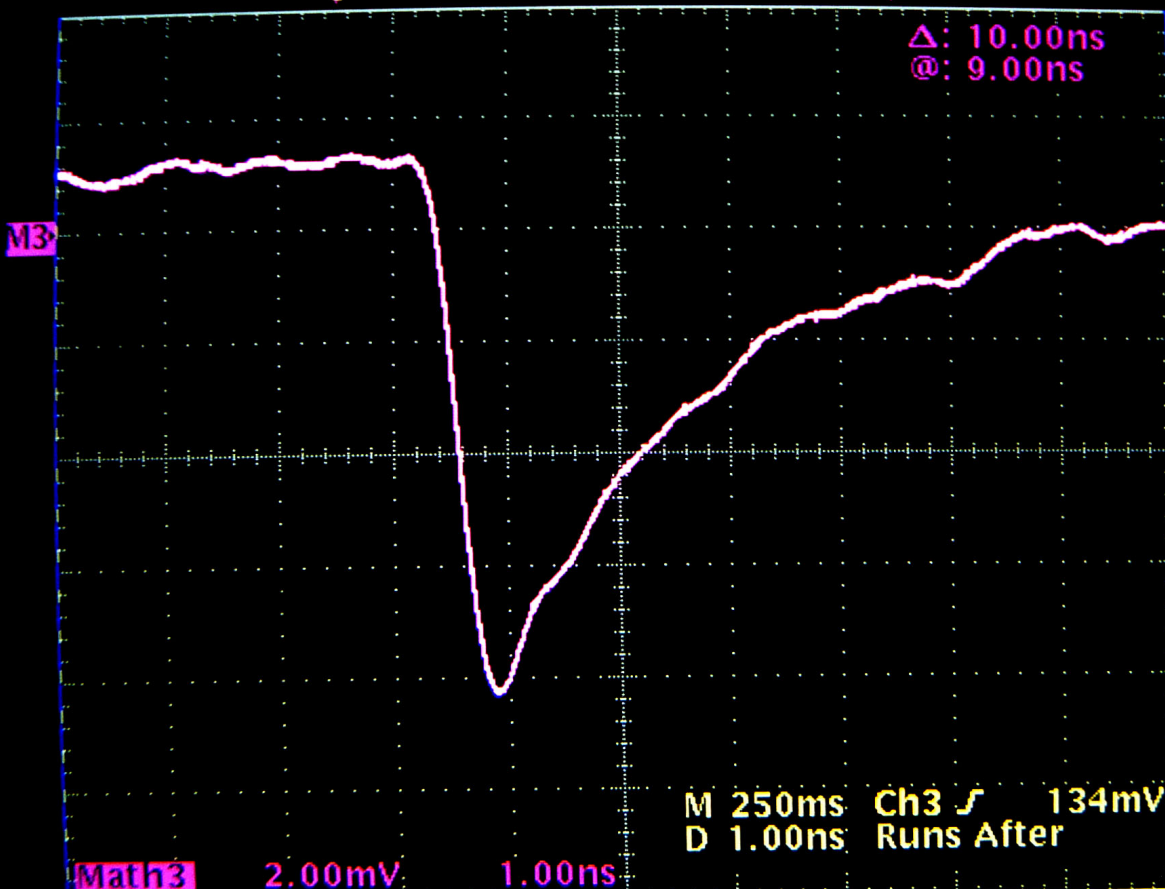
TDS 604C



10 ns full scale

Tek **STOP** 5.00GS/s

349 Acqs



Save  
Waveform



To File

To Ref1  
*active*

To Ref2  
*active*

To Ref3  
*active*

To Ref4  
*active*

Recall Wfm  
to Ref

Save Wfm  
*Math3*

Delete  
Refs

Autosave  
Single Seq  
*OFF*

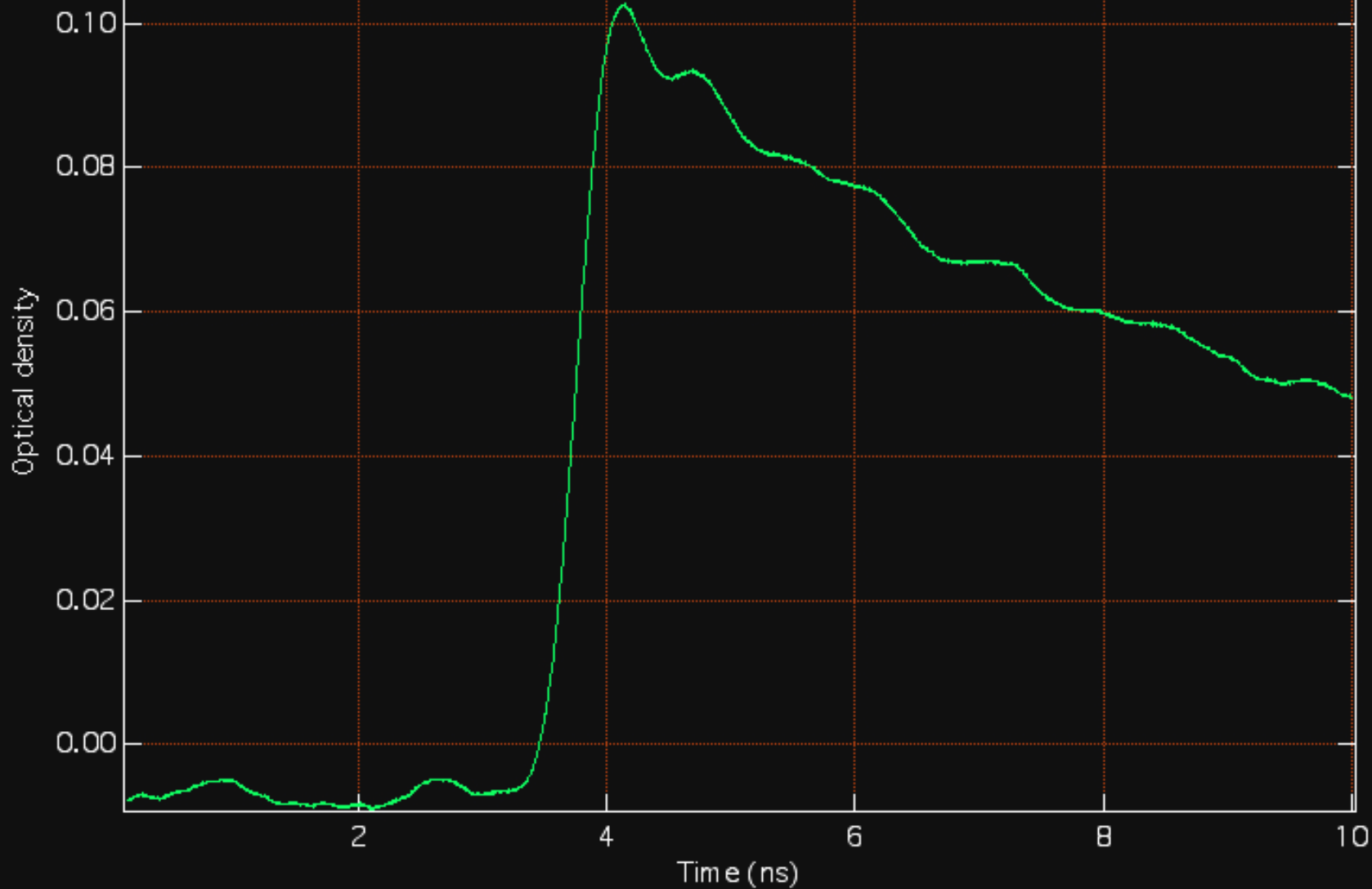
Save  
Format  
*Internal*

File  
Utilities



$\text{H}_2\text{O} + \text{Ni}^{2+}$  ( $8 \times 10^{-5}$  mol L $^{-1}$ ) + EtOH + Ar

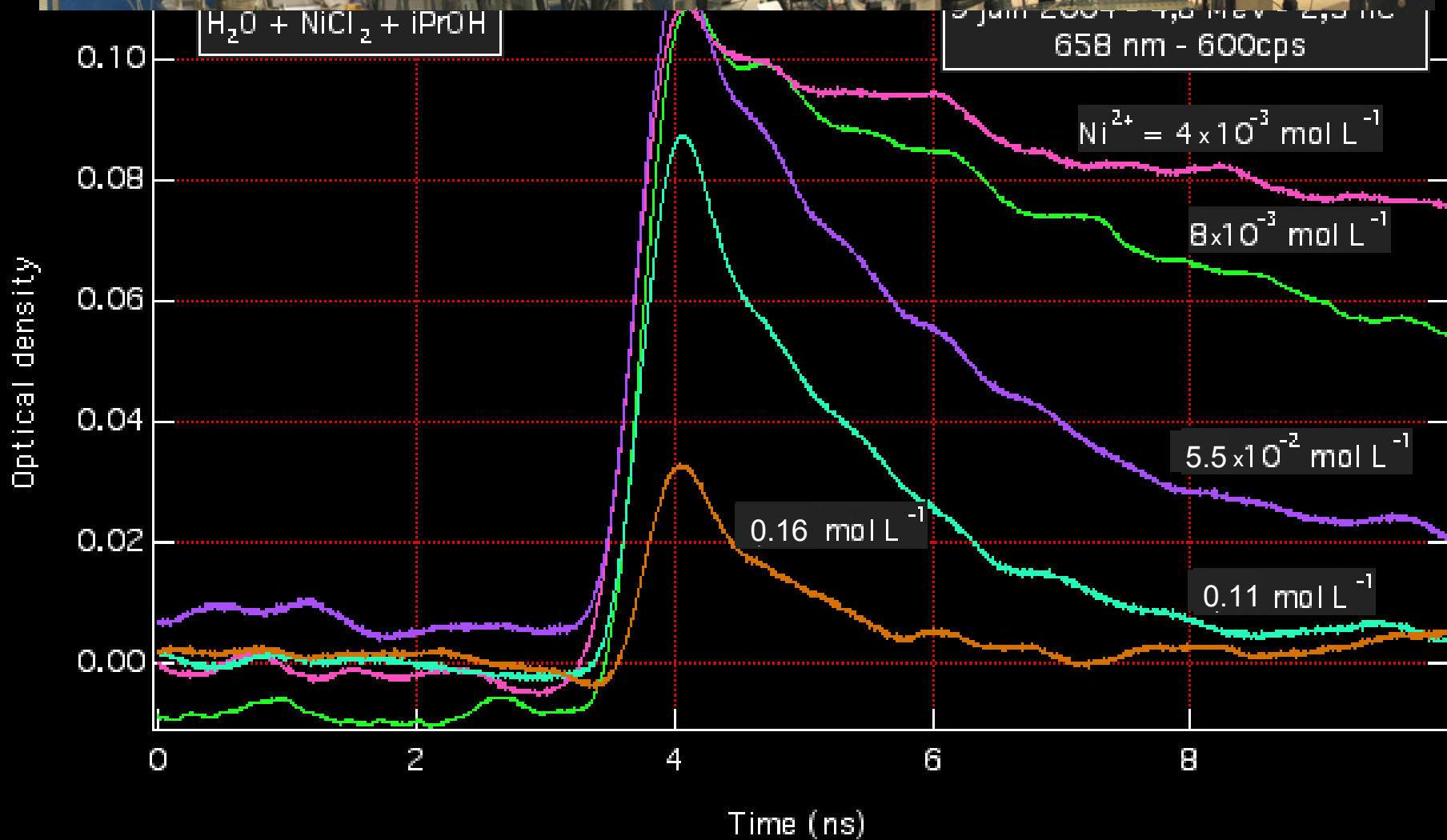
9 juin 2004 - 4.8 MeV - 2,5 nC  
658 nm - 600cps



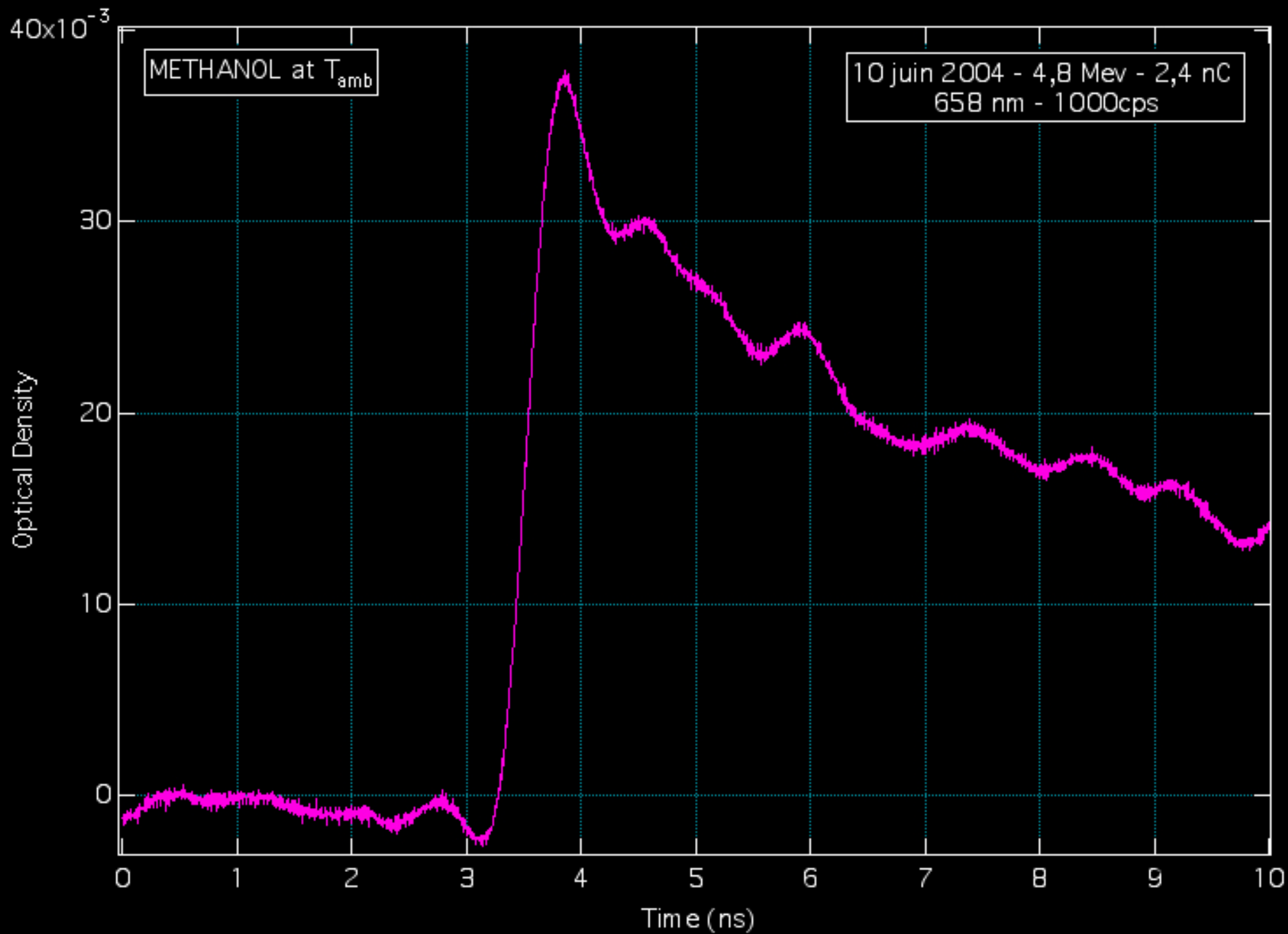


$\text{H}_2\text{O} + \text{NiCl}_2 + \text{iPrOH}$

9 Jun 2007 1,0 MeV 2,3 ns  
658 nm - 600cps







# Streak-Camera

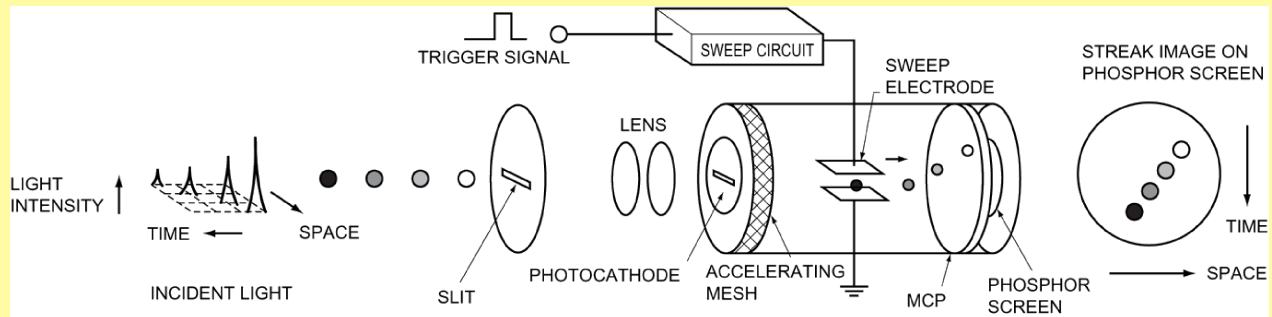


Fig.1 Operating Principle of the Streak Tube

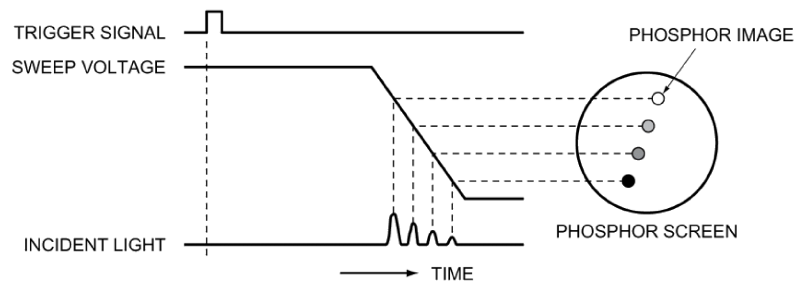
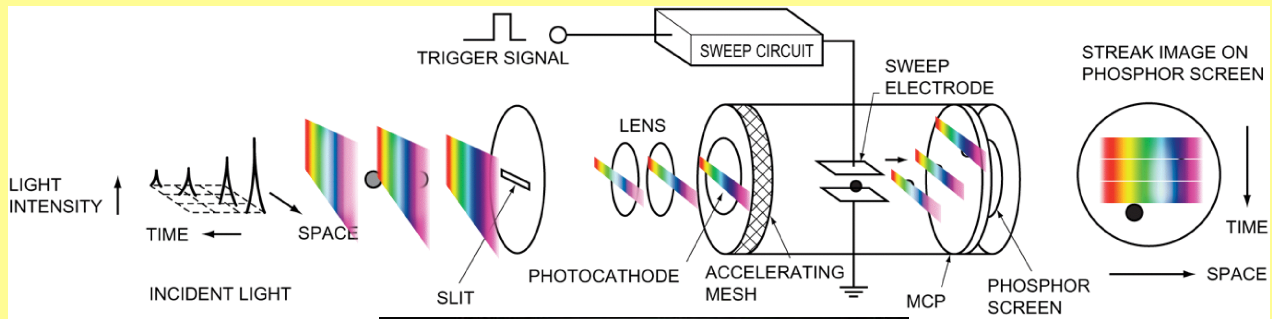
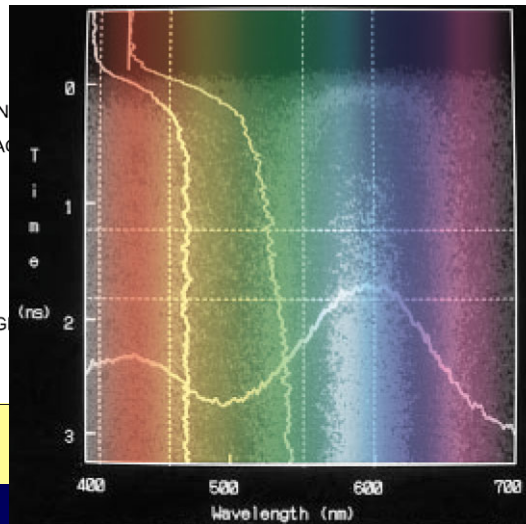


Fig. 2 Operation Timing (at time of sweep)

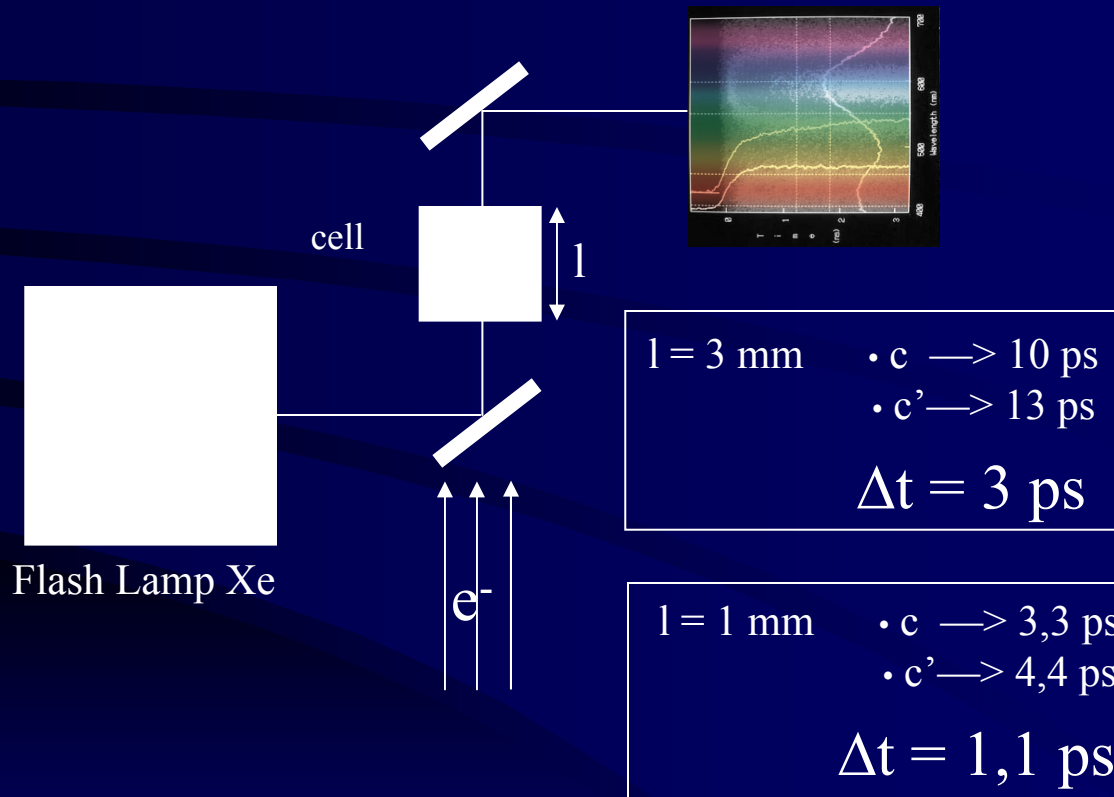
# Streak-Camera



TRIGGER SIGNAL  
SWEEP VOLTAGE  
INCIDENT LIGHT

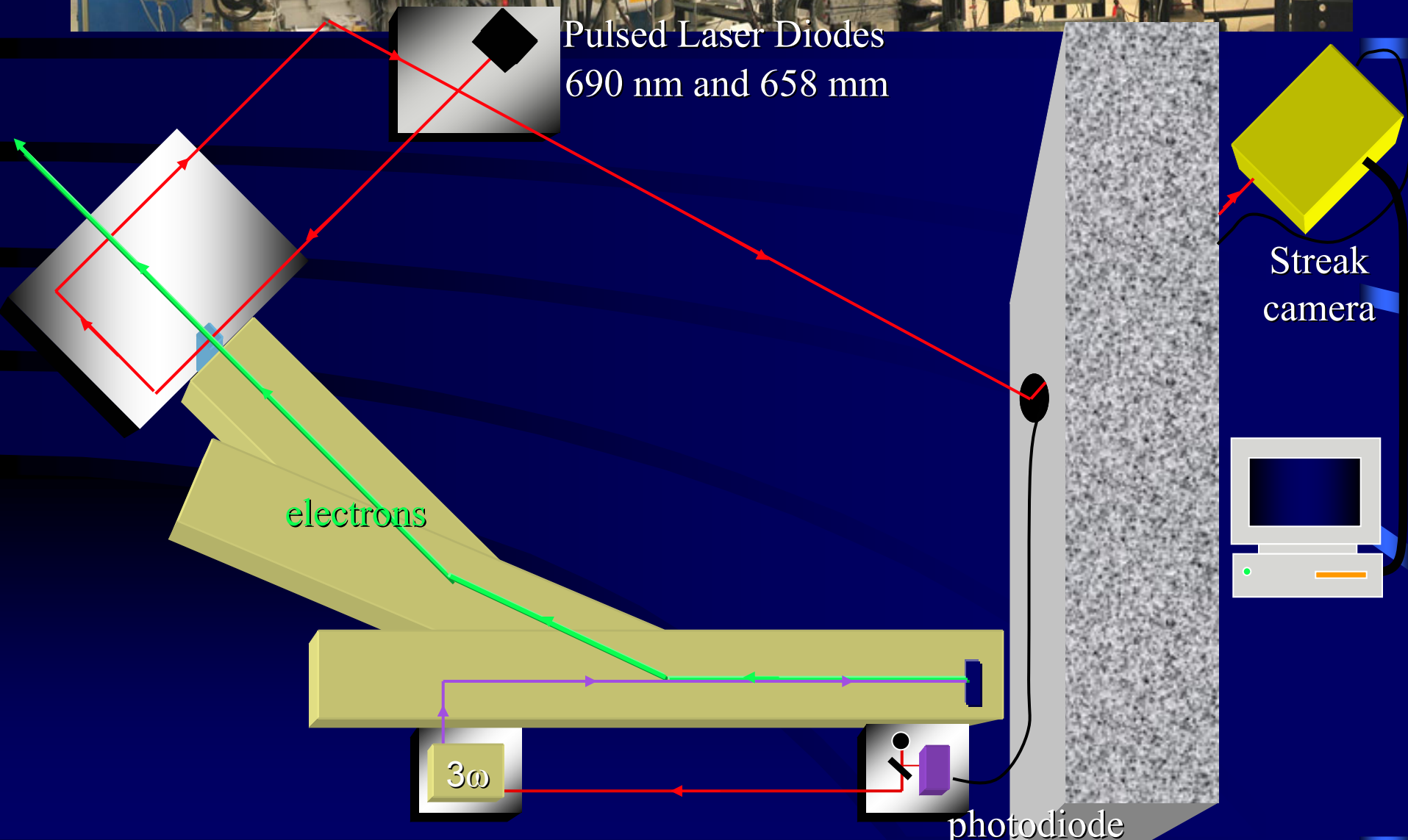


# Streak-Camera



$$c' = c/n ; \text{ in } \text{H}_2\text{O}, n = 1,33$$

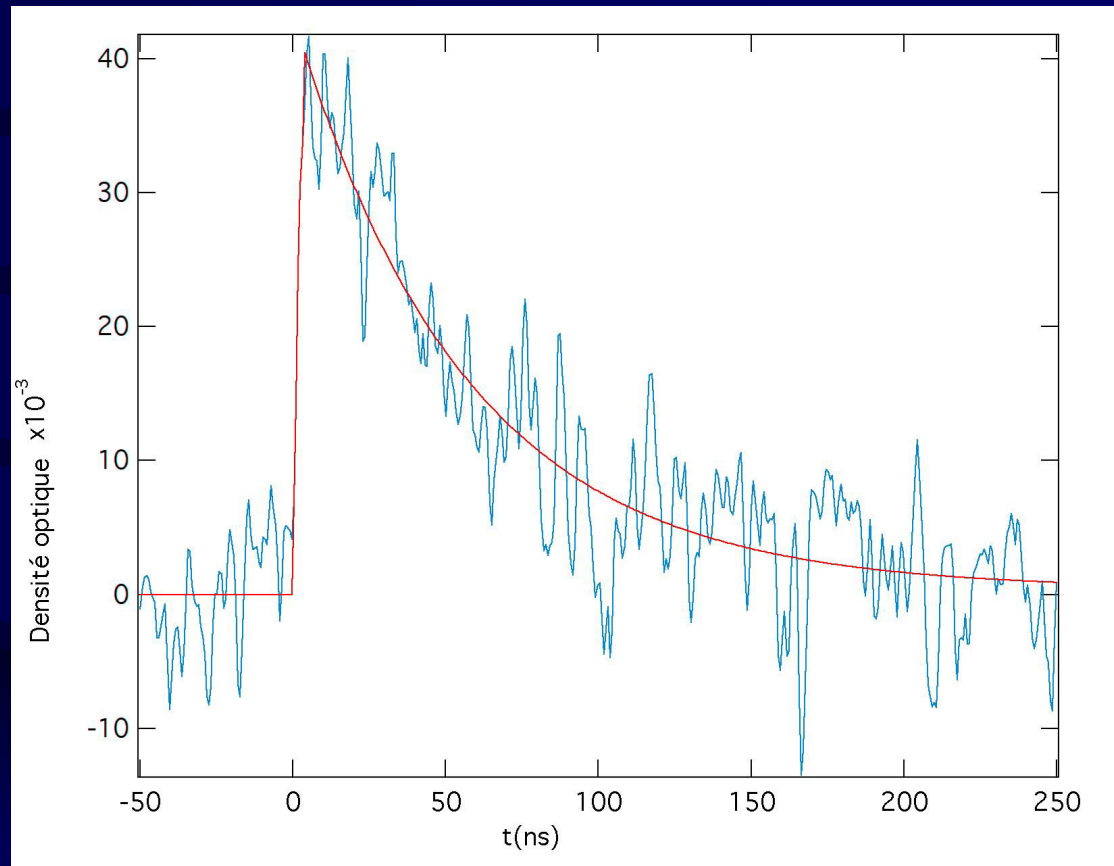
# Area 3 : transient absorption with a streak-camera



# Absorption measurements with a streak-camera

Streak-camera  
from  
Optronis (Germany)

1000 sweeps  
at 10 Hz

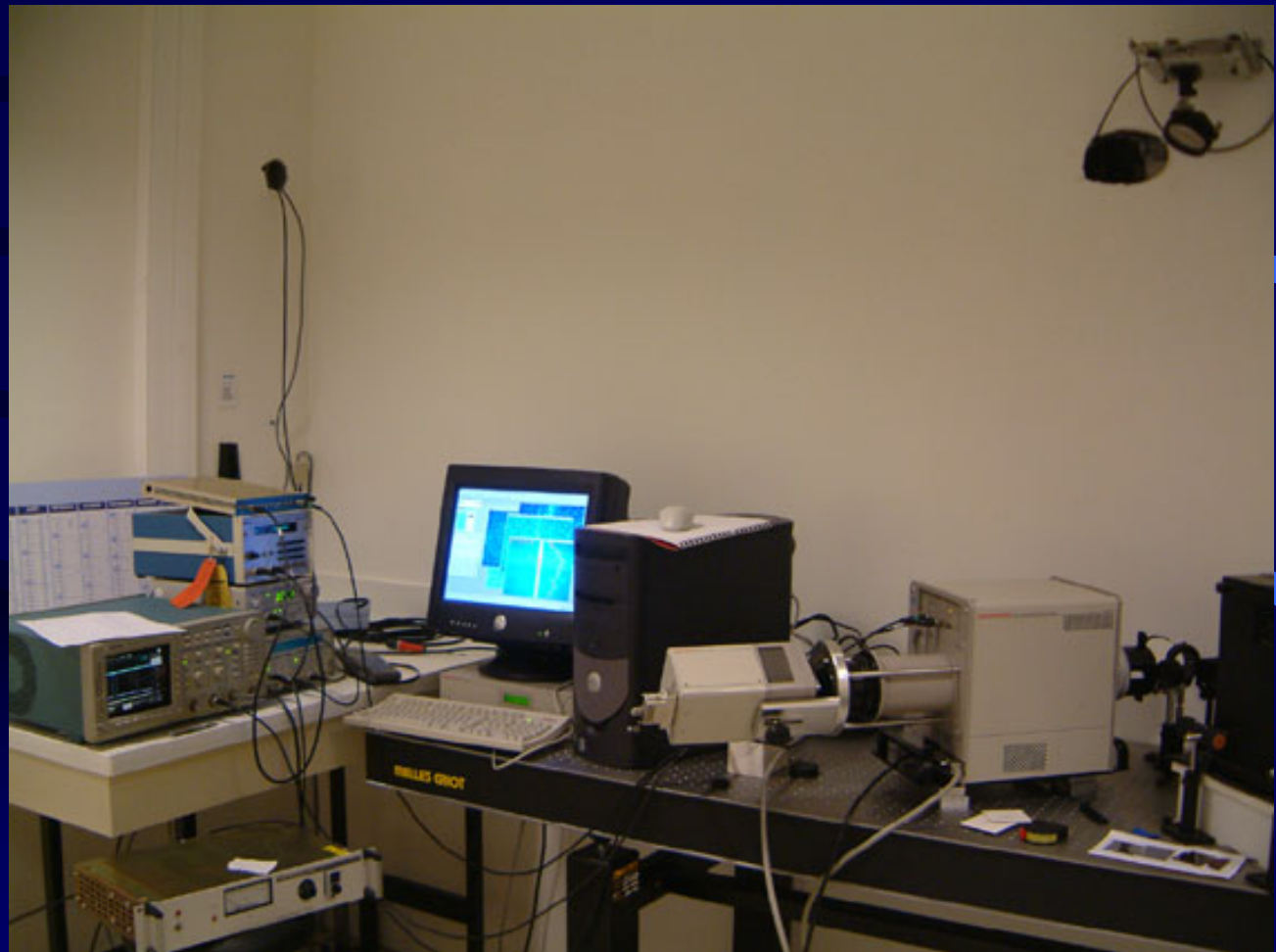


Analyzing light : Pulsed laser diode at 690 nm

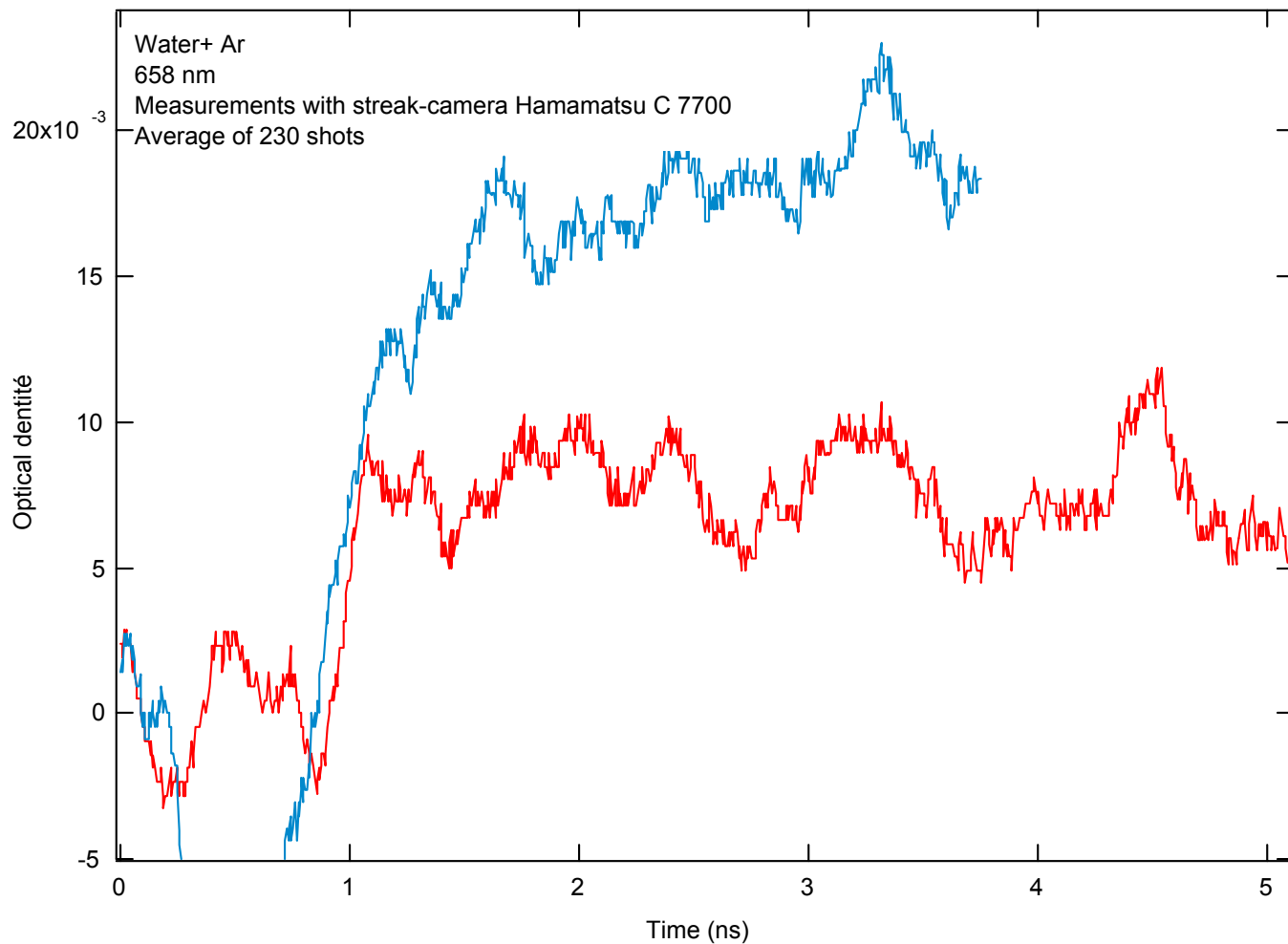


# Absorption measurements with a streak-camera

Streak-camera  
from  
Hamamatsu



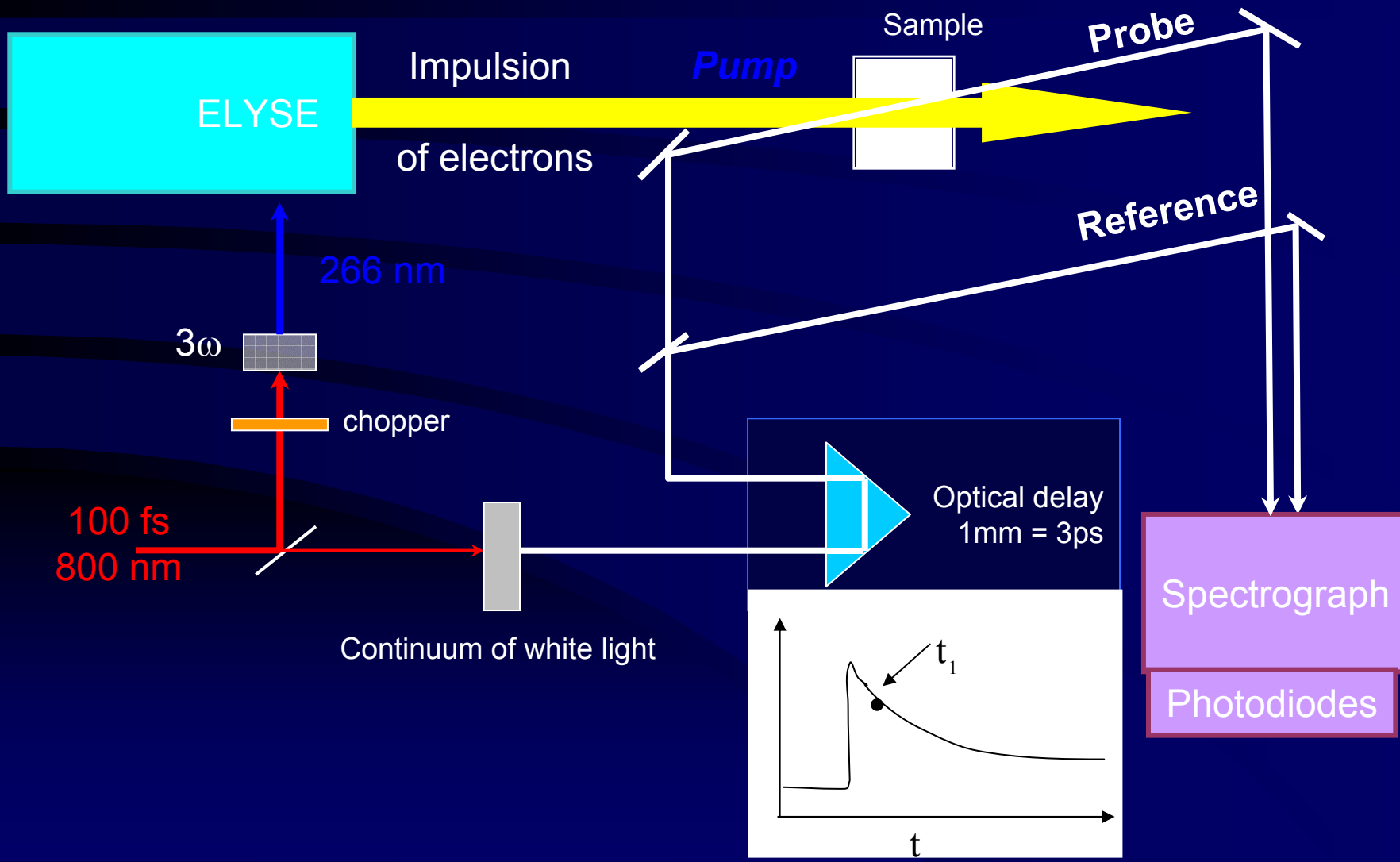
# Absorption measurements with a streak-camera





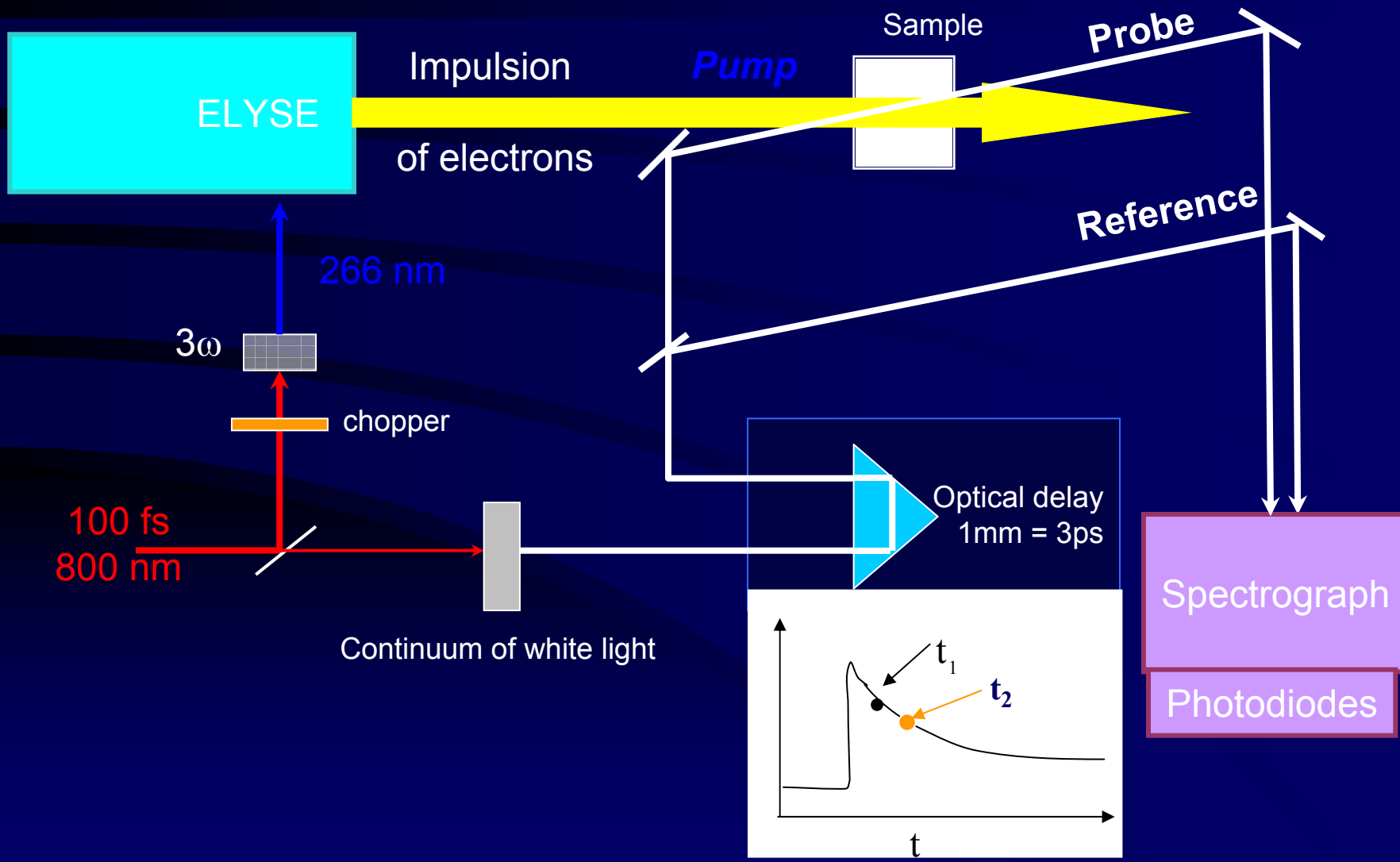


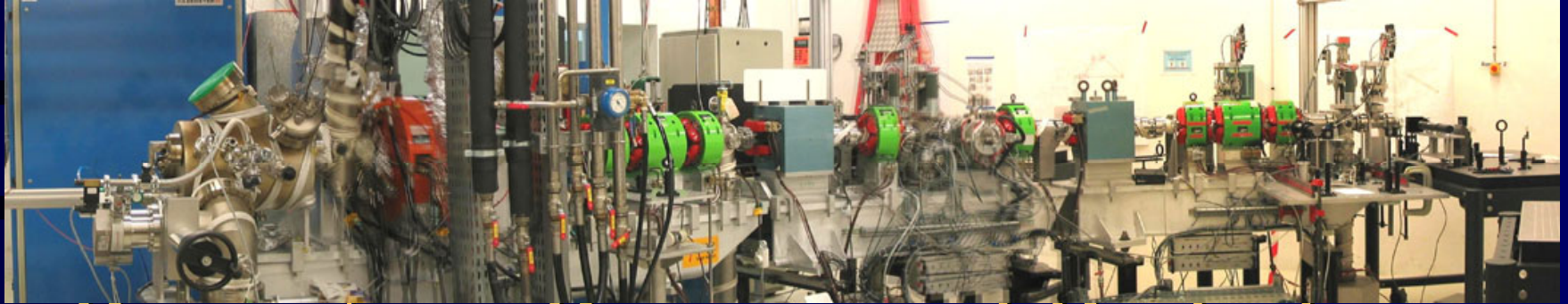
# Area 3 : Pump-Probe set-up





# Area 3 : Pump-Probe set-up





# Projects in Picosecond Radiolysis

Dynamics of anion solvation

Competition between solvation and electron attachment

Electron transfer in solution

Confined micro-phases kinetics (zeolites, micelles)

High temperature dynamics