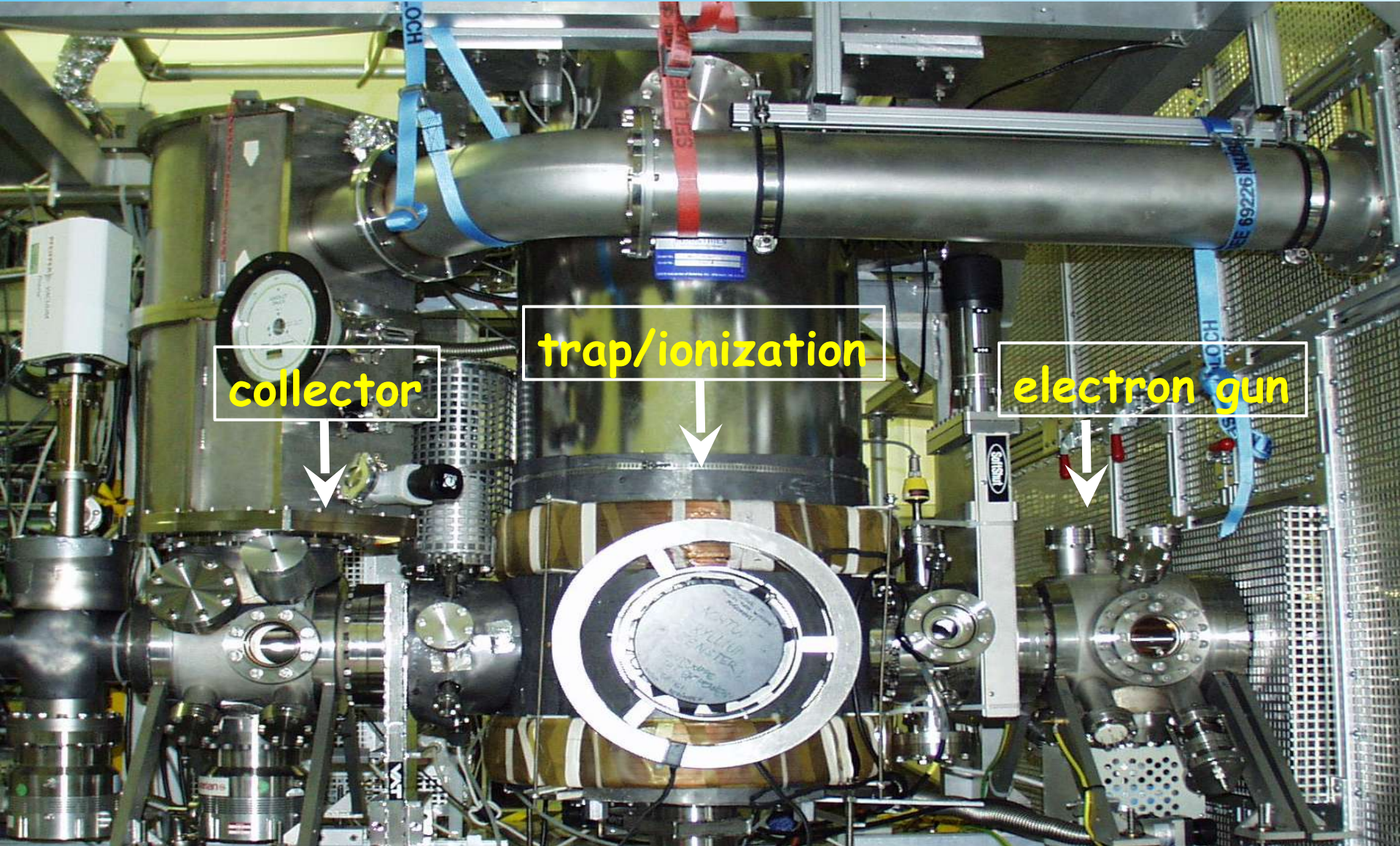


Do Electrons and Ions Coexist in an EBIT ?

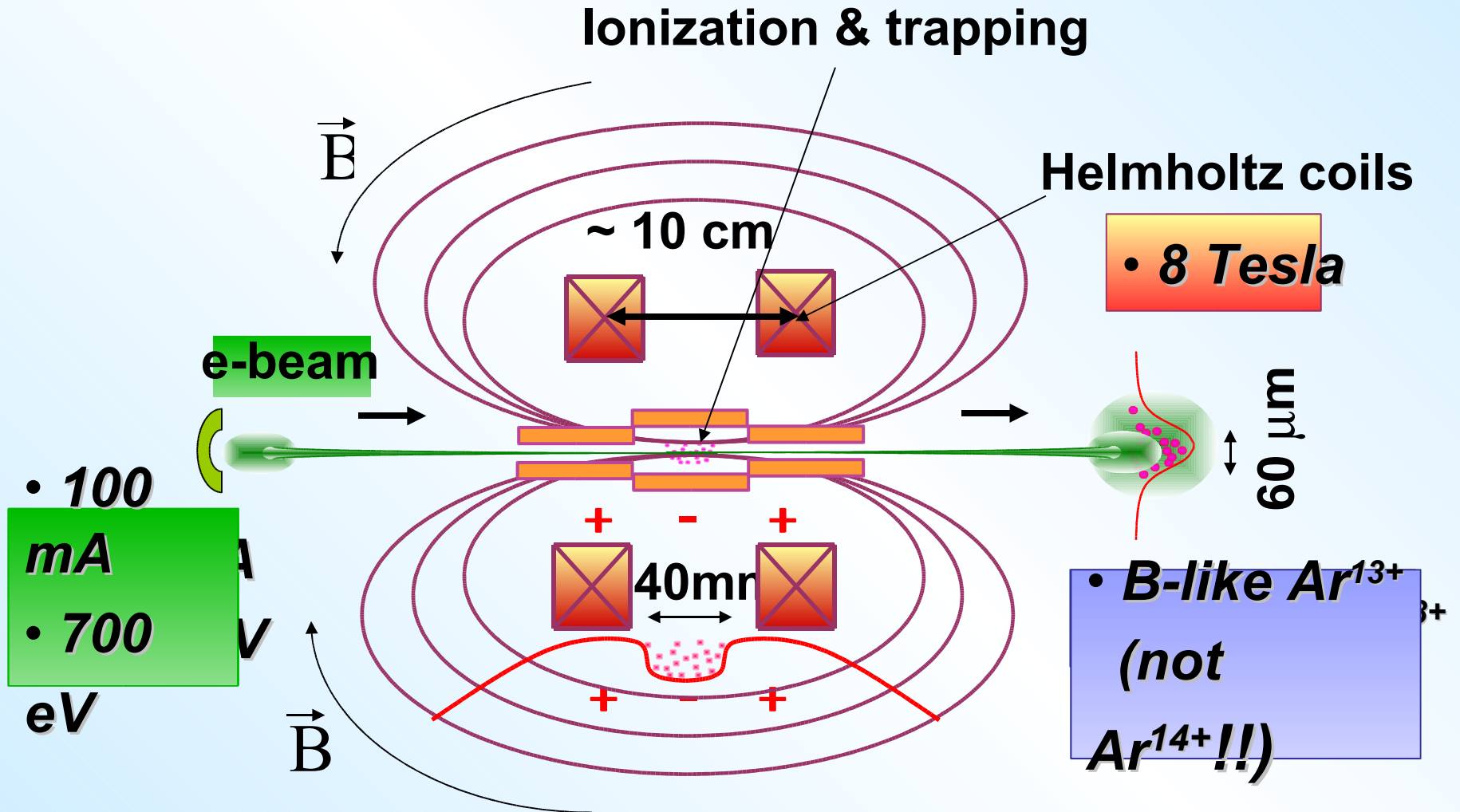


collector

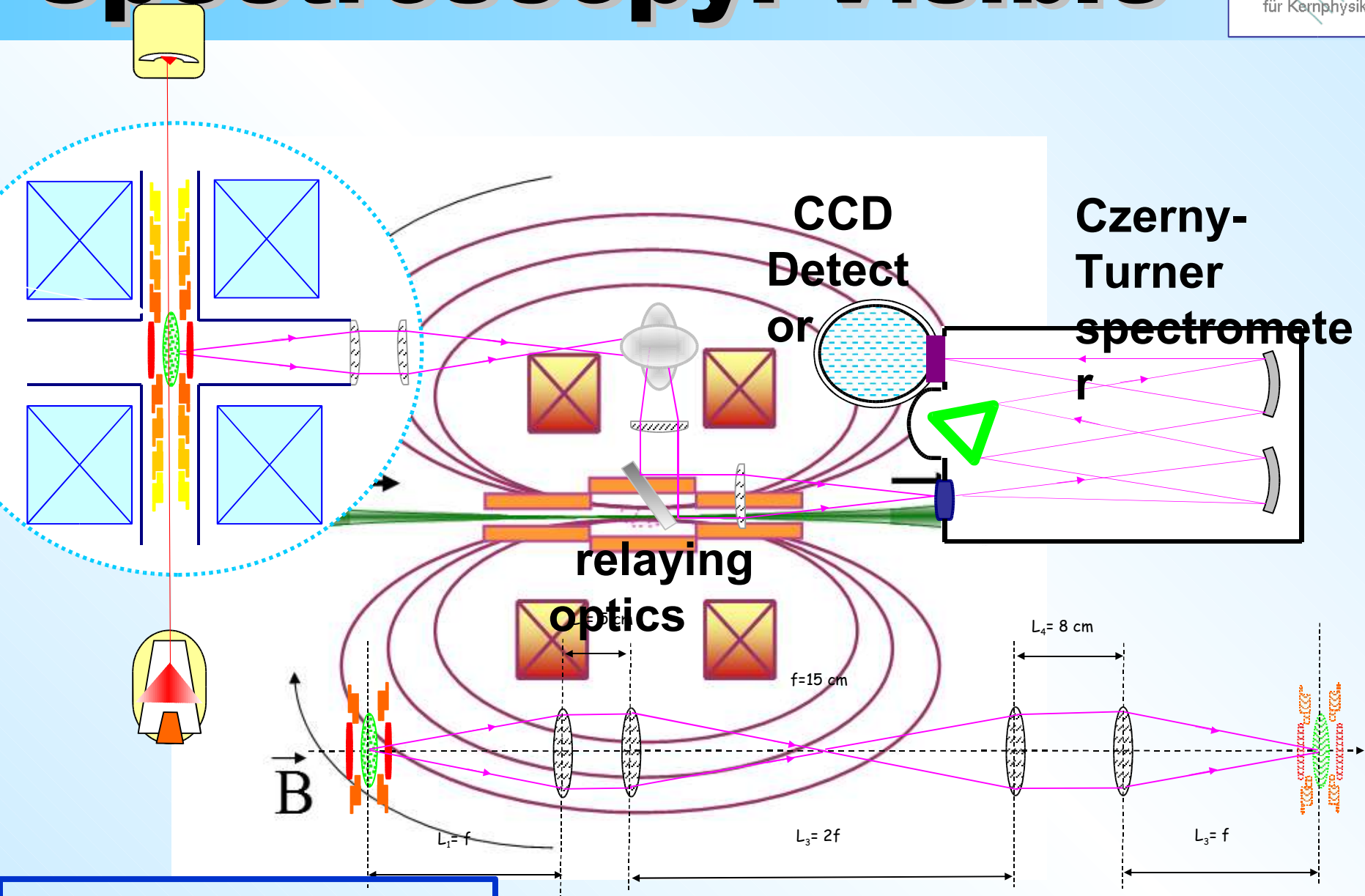
trap/ionization

electron gun

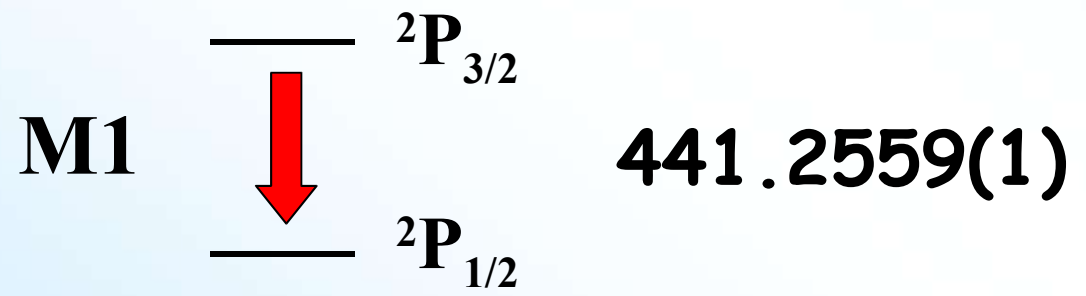
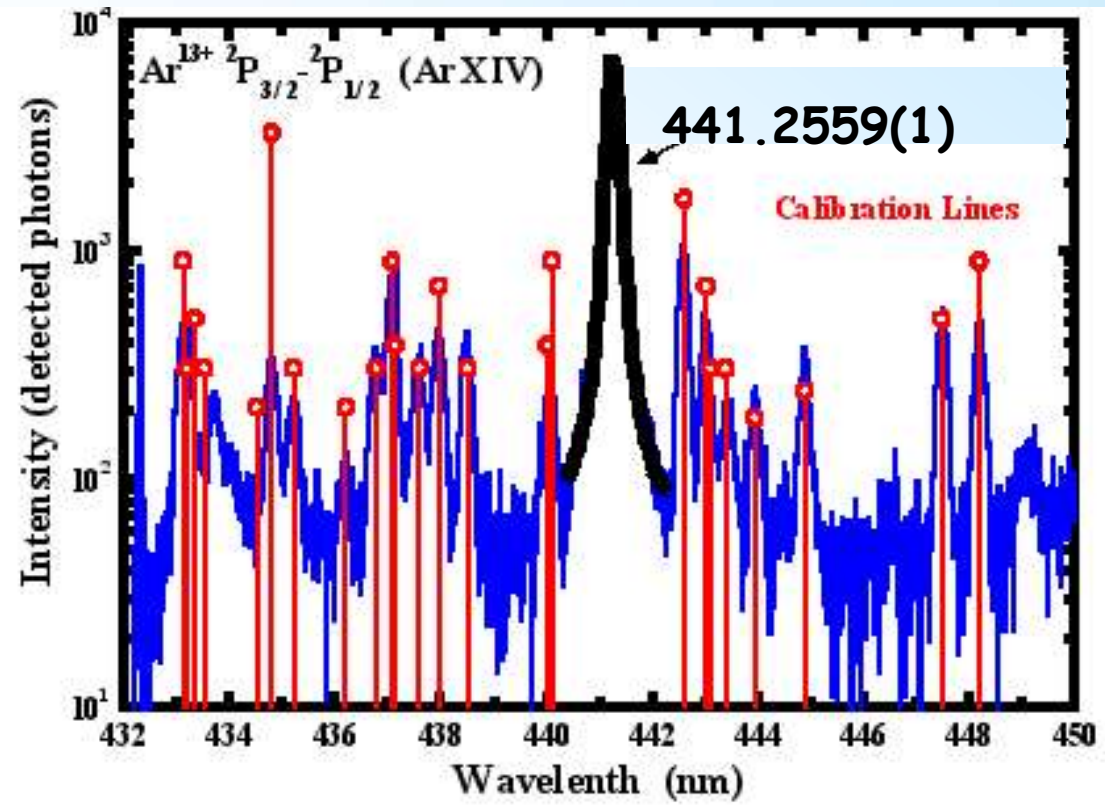
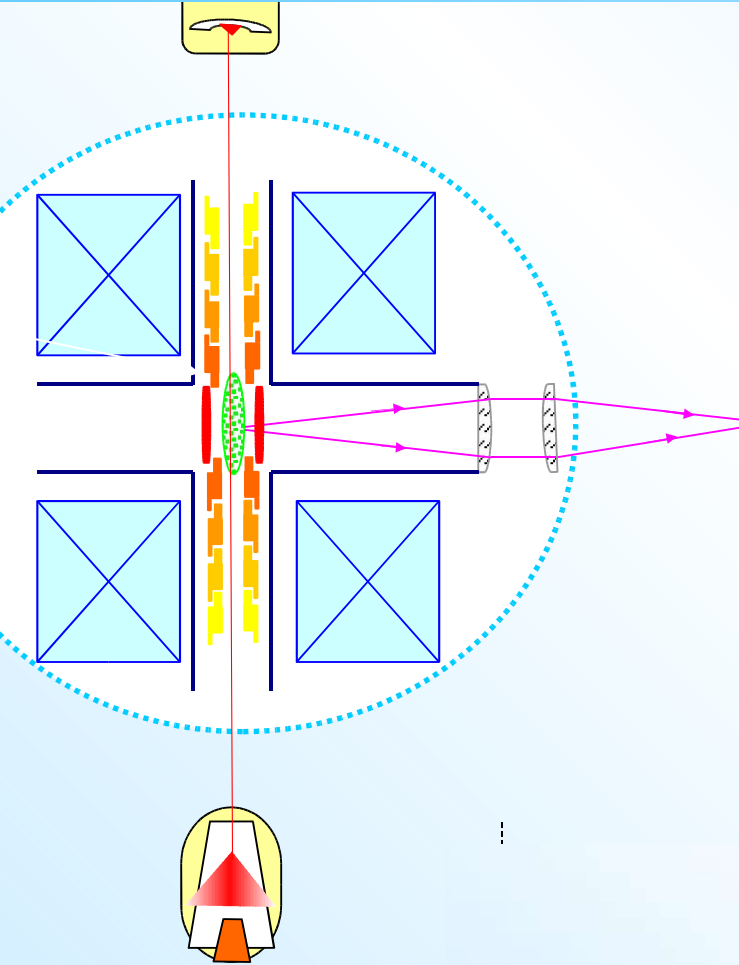
Operation Schematic



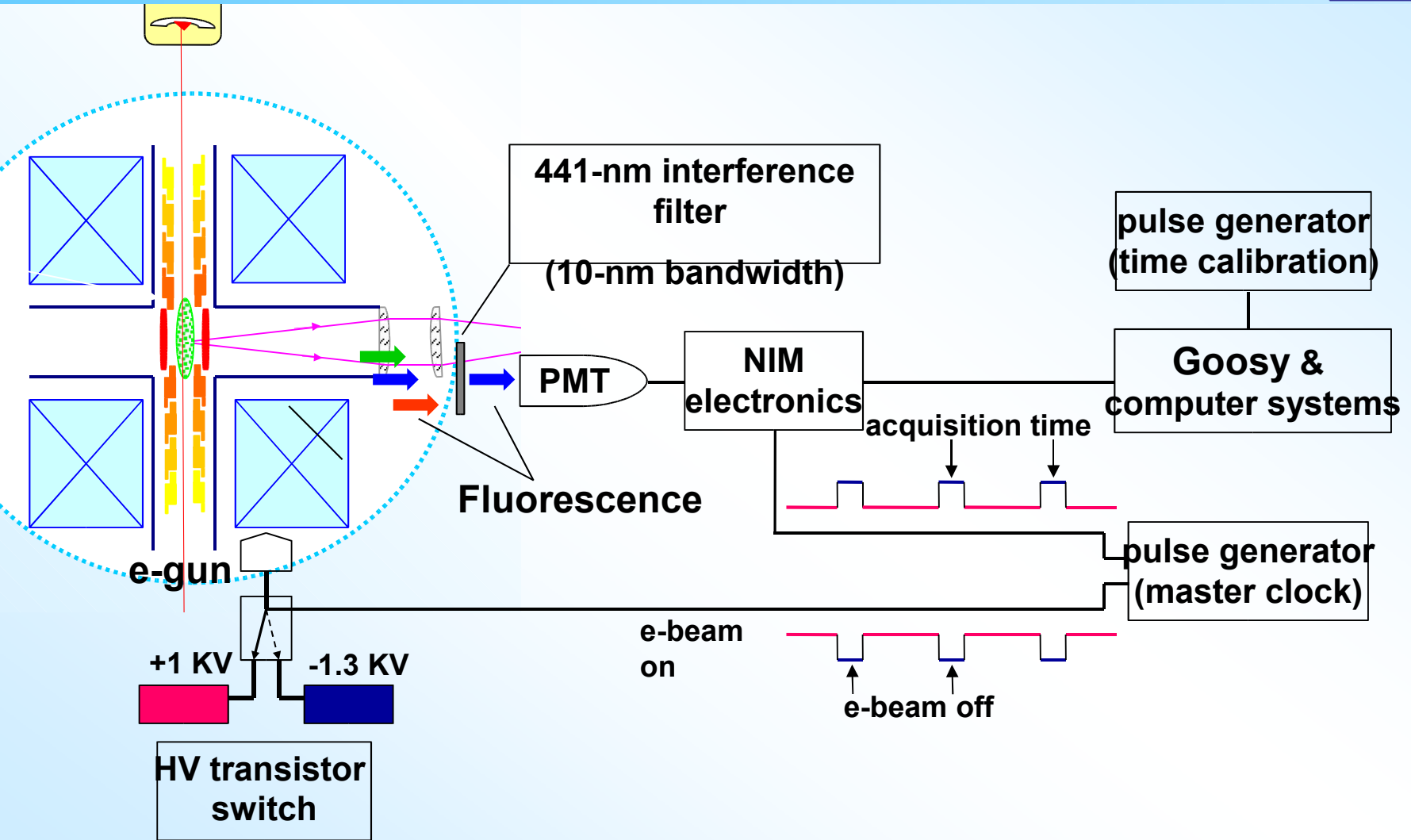
Spectroscopy: Visible



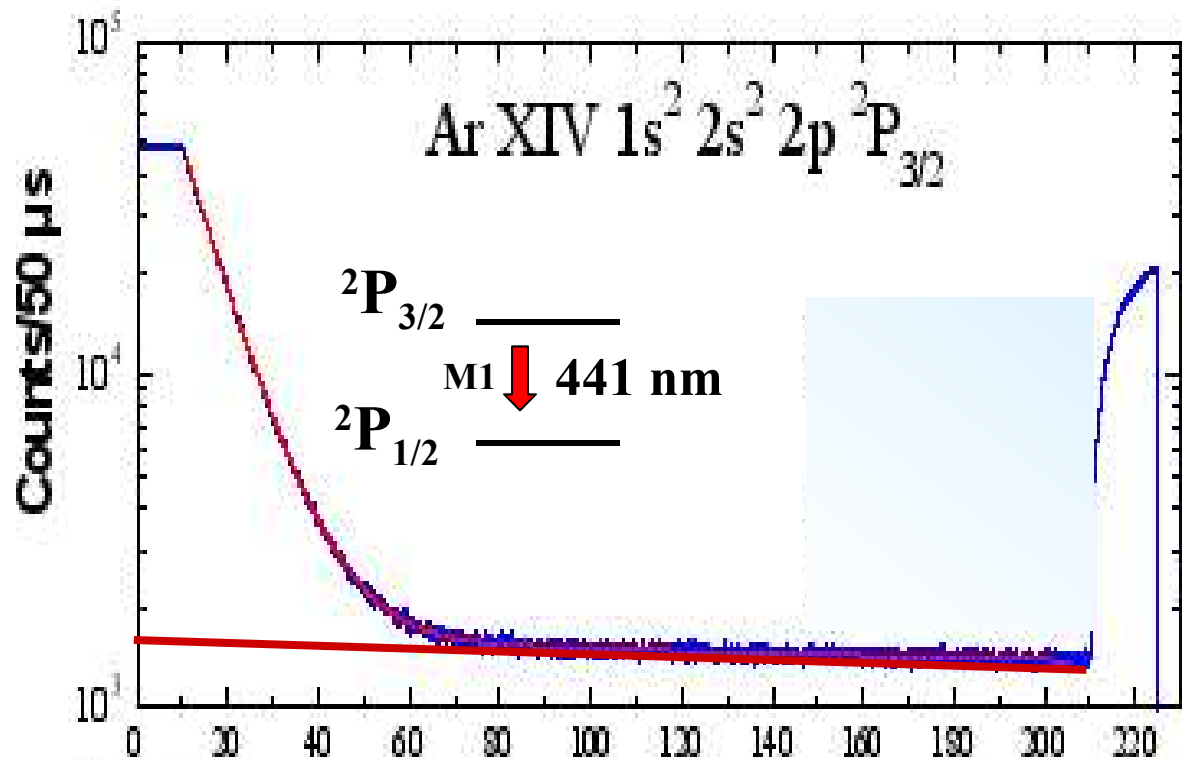
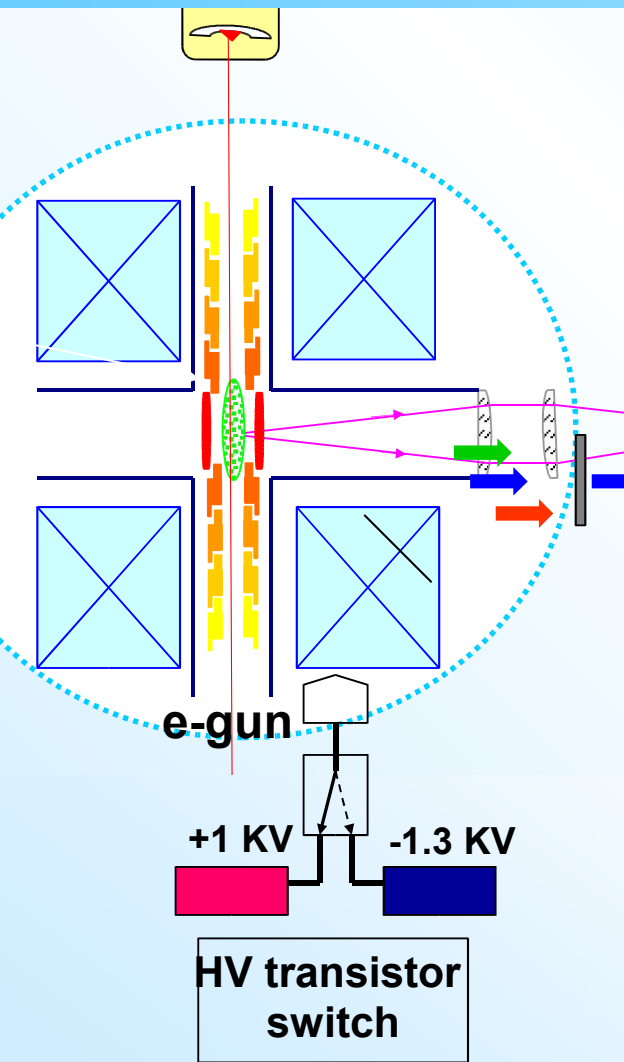
Spectroscopy: Visible



Lifetime: Visible



Lifetime: Visible



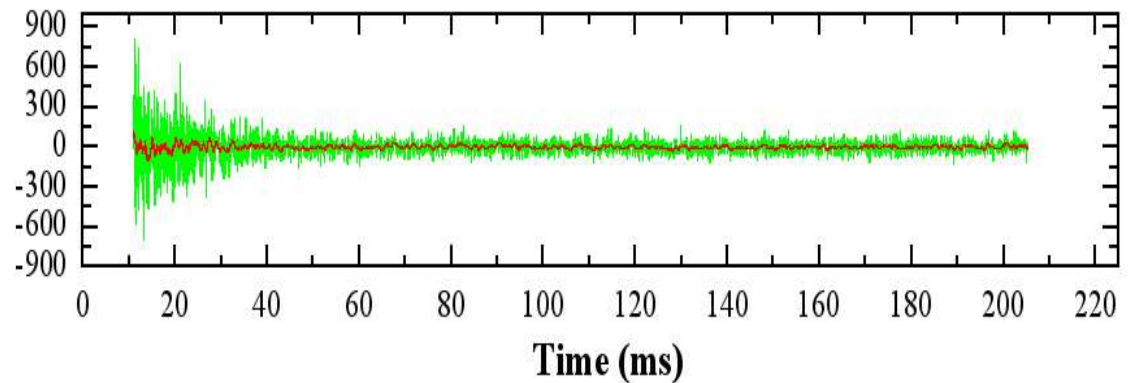
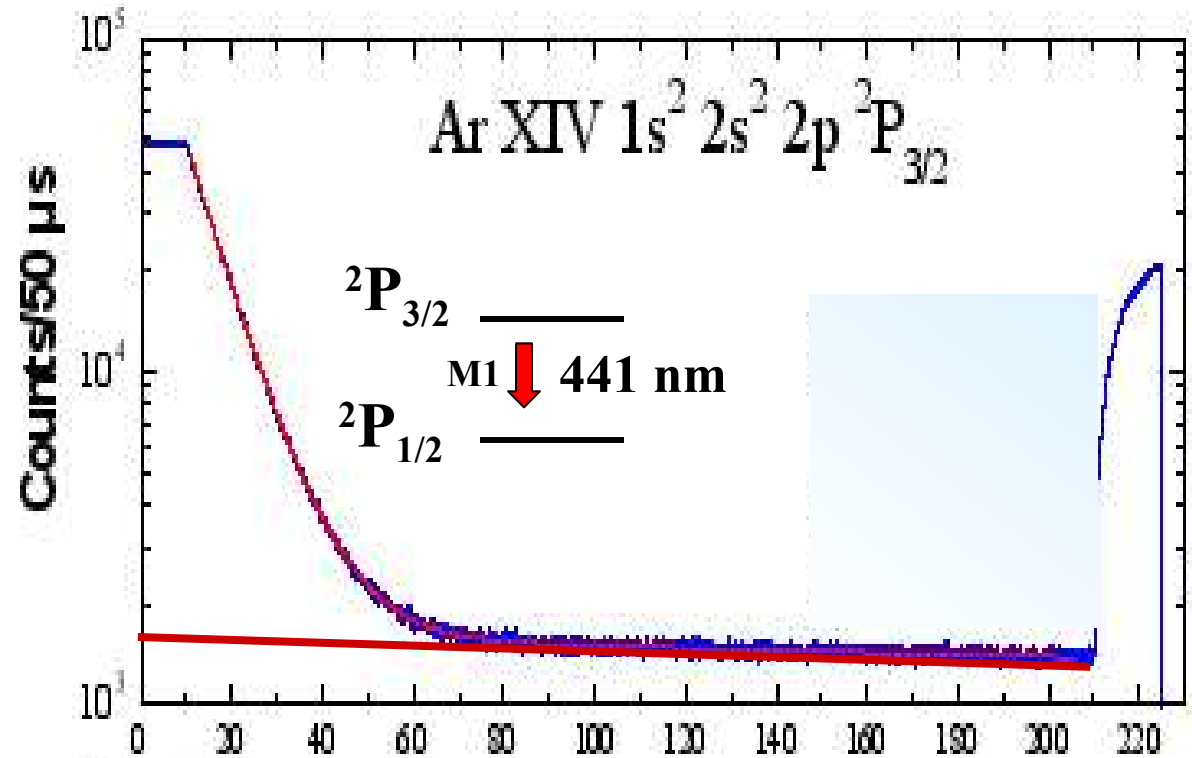
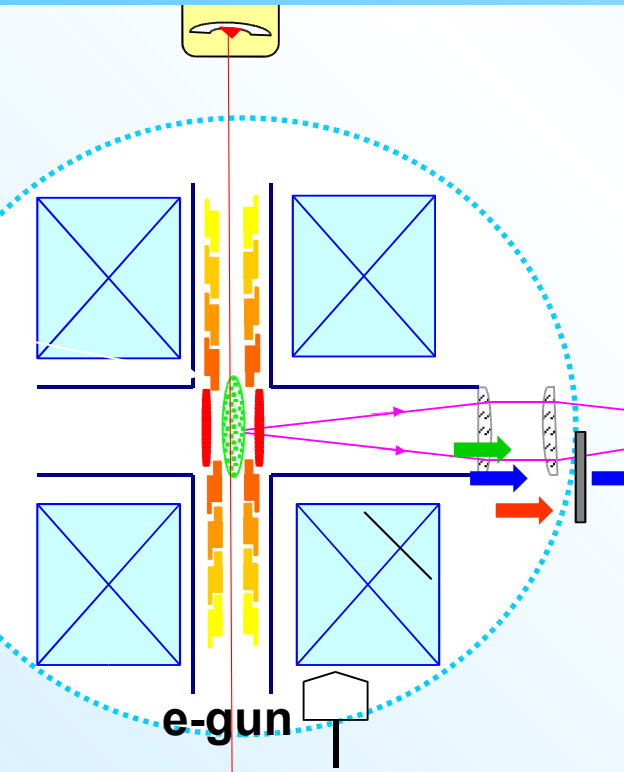
$$\tau = 9.573(4)/(5) \text{ ms}$$

Exp ***A slowly decaying background***

Theory: RQDO = 9.58 ms; SS98 = 9.57
CIDFS = 9.54

MCBP = 9.52 ms; STF = 9.52

Lifetime: Background?



Possible Reasons:

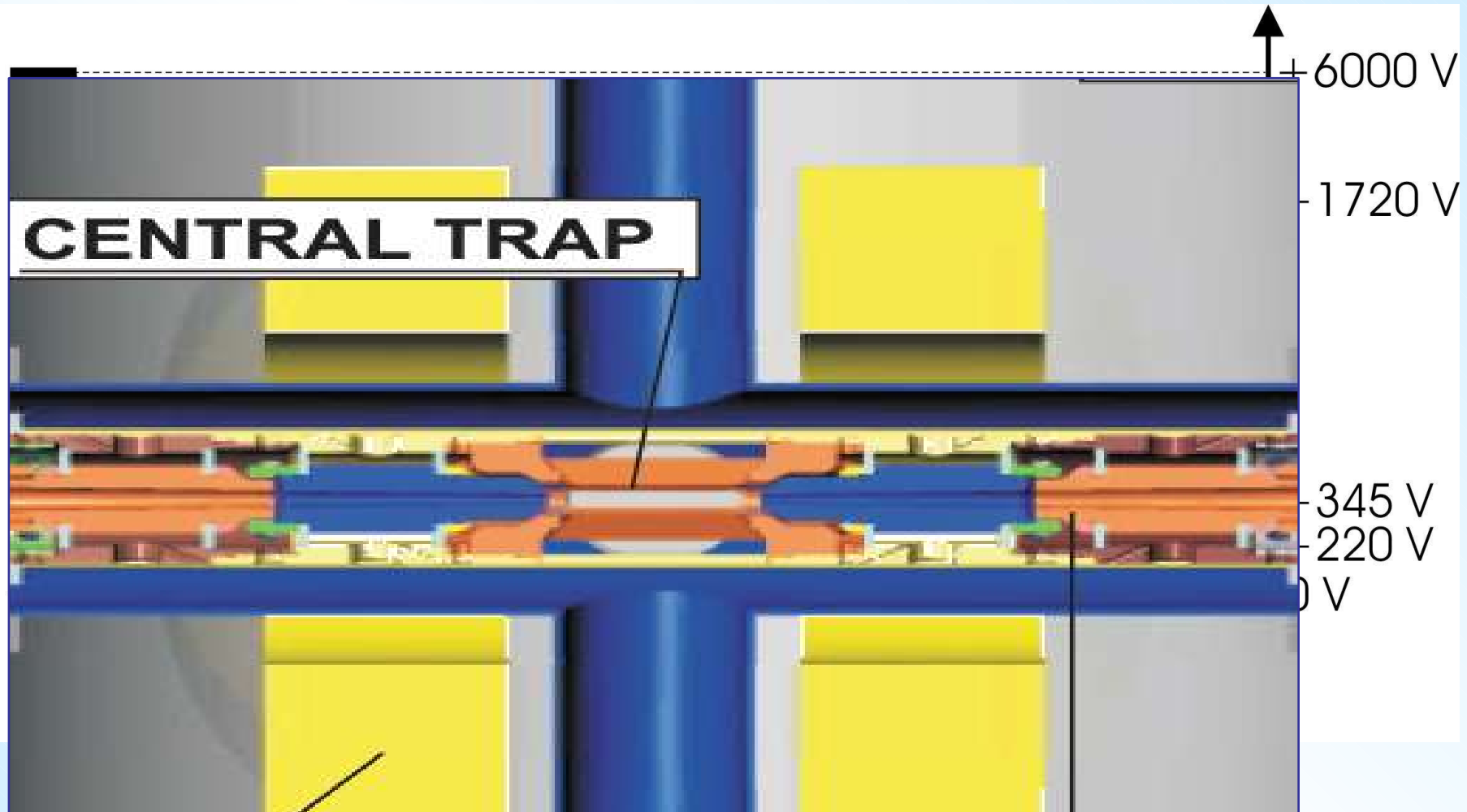
Ion-ion collisional excitation

Charge exchange collisions

Cascade repopulation

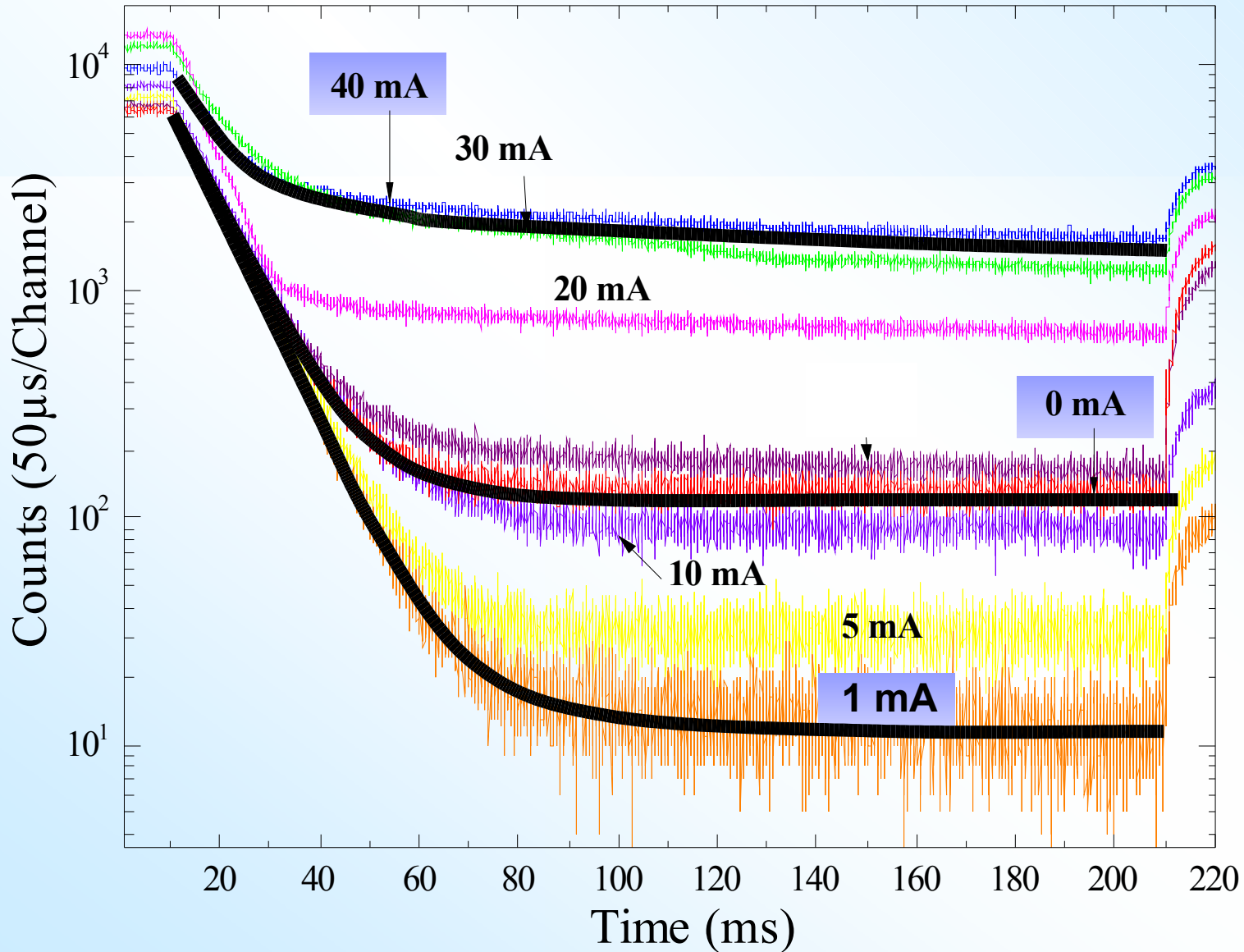
Electron impact excitation

Trapped electrons?

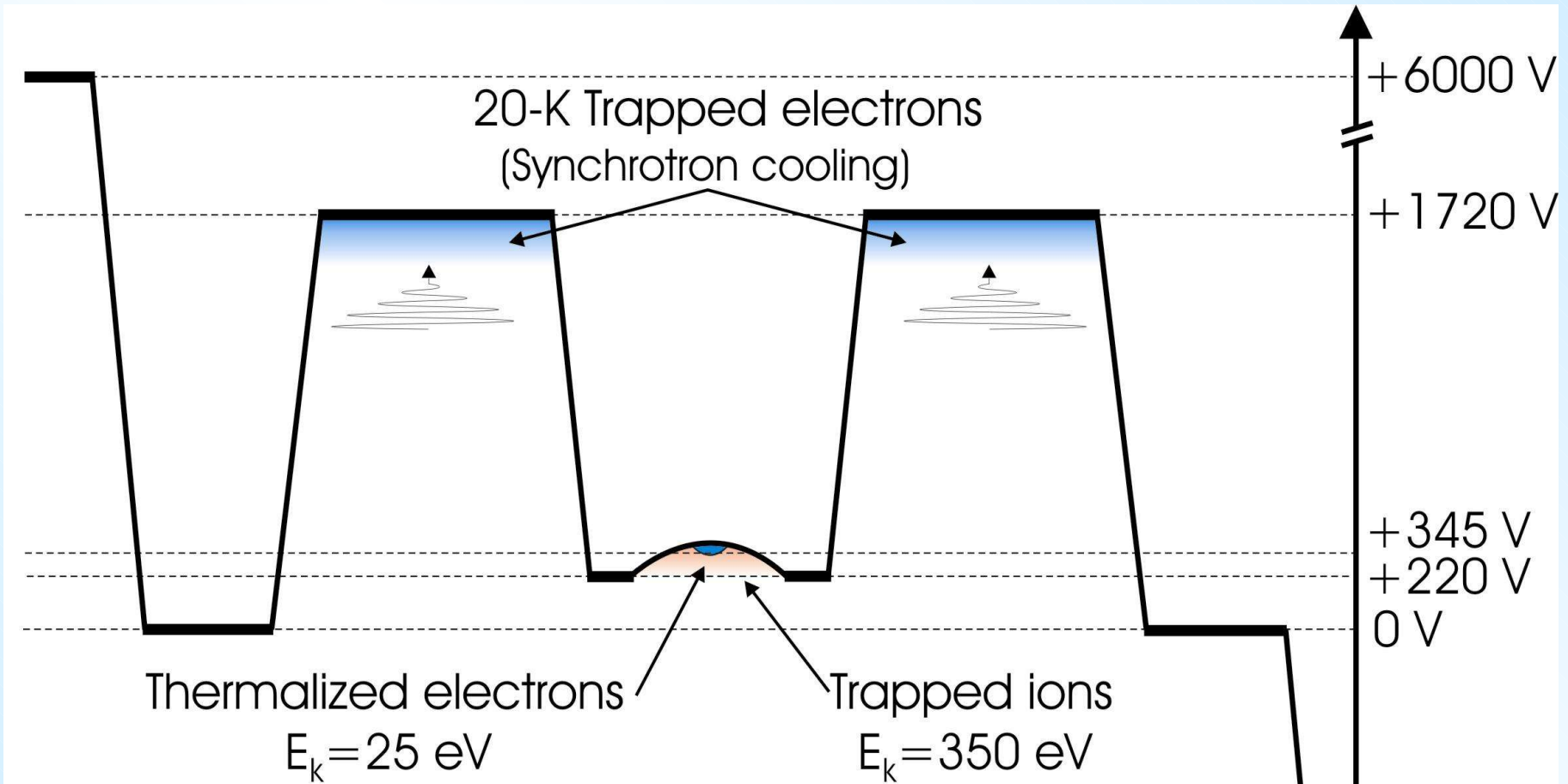


Acc According to H. Higaki: maybe right

Trapped electrons?



Trapped electrons?



Trapped electrons pushed away by electro

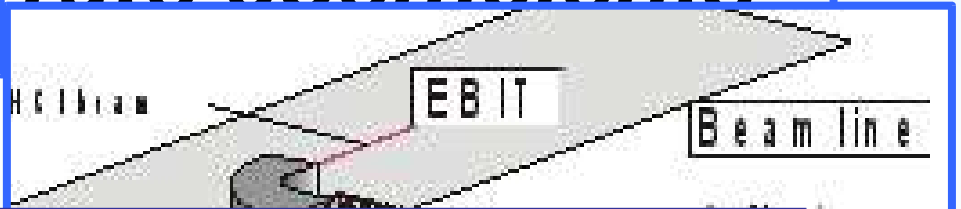
Trapped electrons?

$k_B T_e = 25 - 125 \text{ eV}$ \longleftrightarrow measured/estimated S

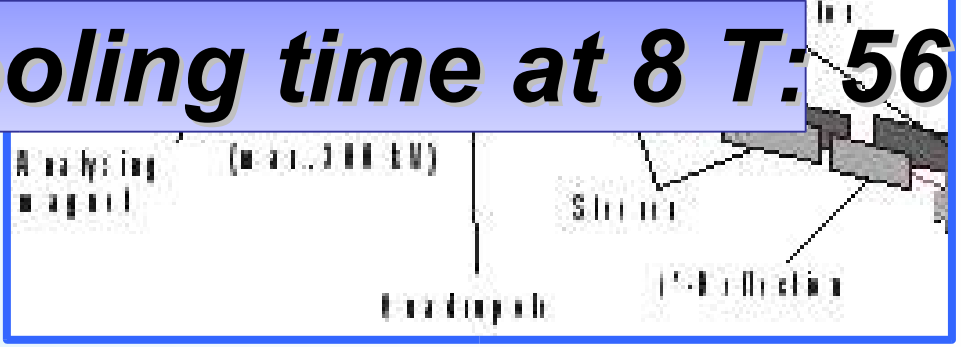
$U_{ion} \sim +250 \text{ V}$

Maxwellian-averaged

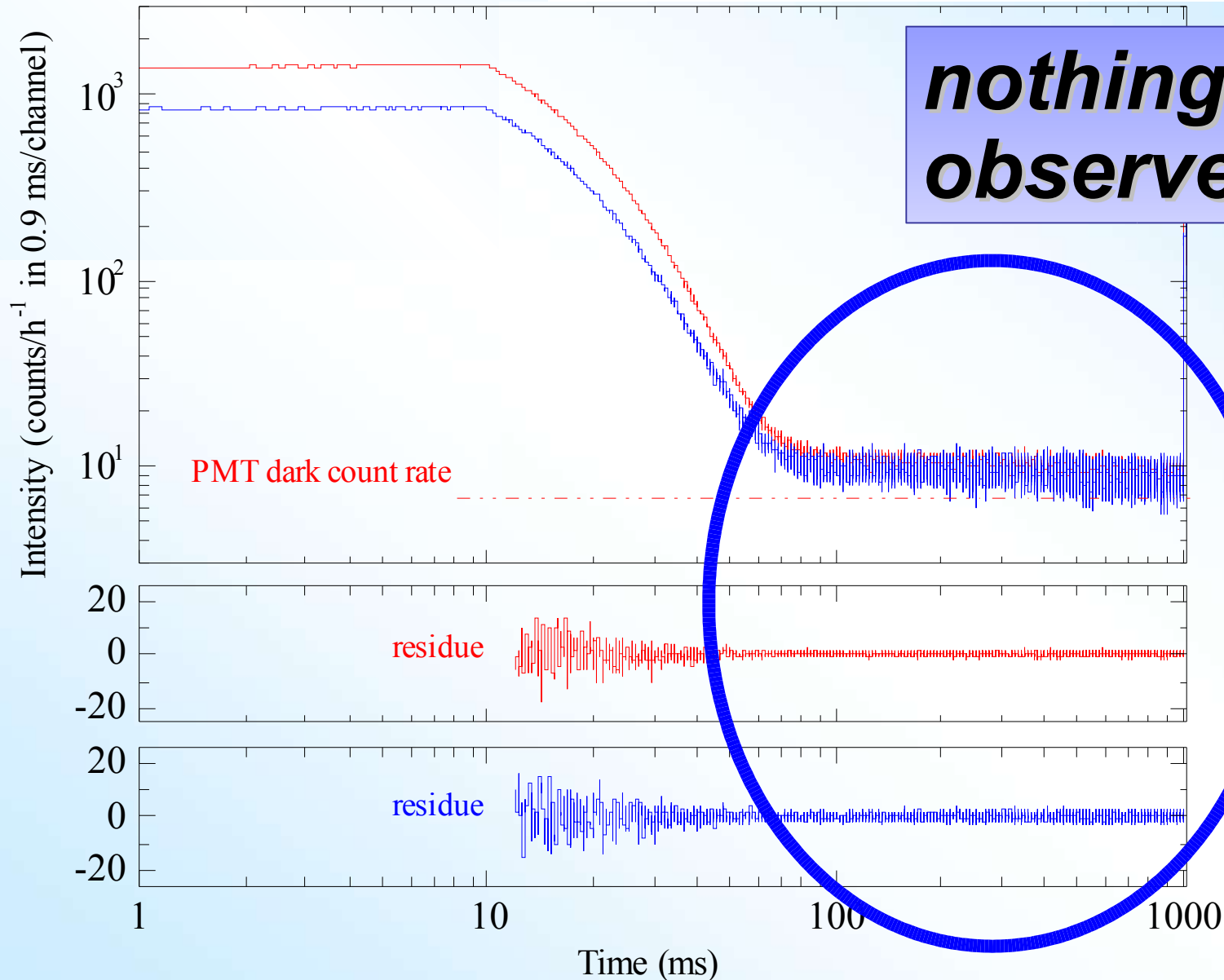
rate coefficients



Synchrotron cooling time at 8 T: 56 ns



Too cold electrons?



nothing to be observed!

Trapped electrons?

$k_B T_e = 25 - 125 \text{ eV}$ \longleftrightarrow *measured/estimated S*

$N_e = 5 \cdot 10^7 \text{ cm}^{-3}$ \longleftrightarrow *T_e plus background ra*

$N_{\text{ion}} = 3 \cdot 10^9 \text{ cm}^{-3}$ \longleftrightarrow *extract ions from trap*

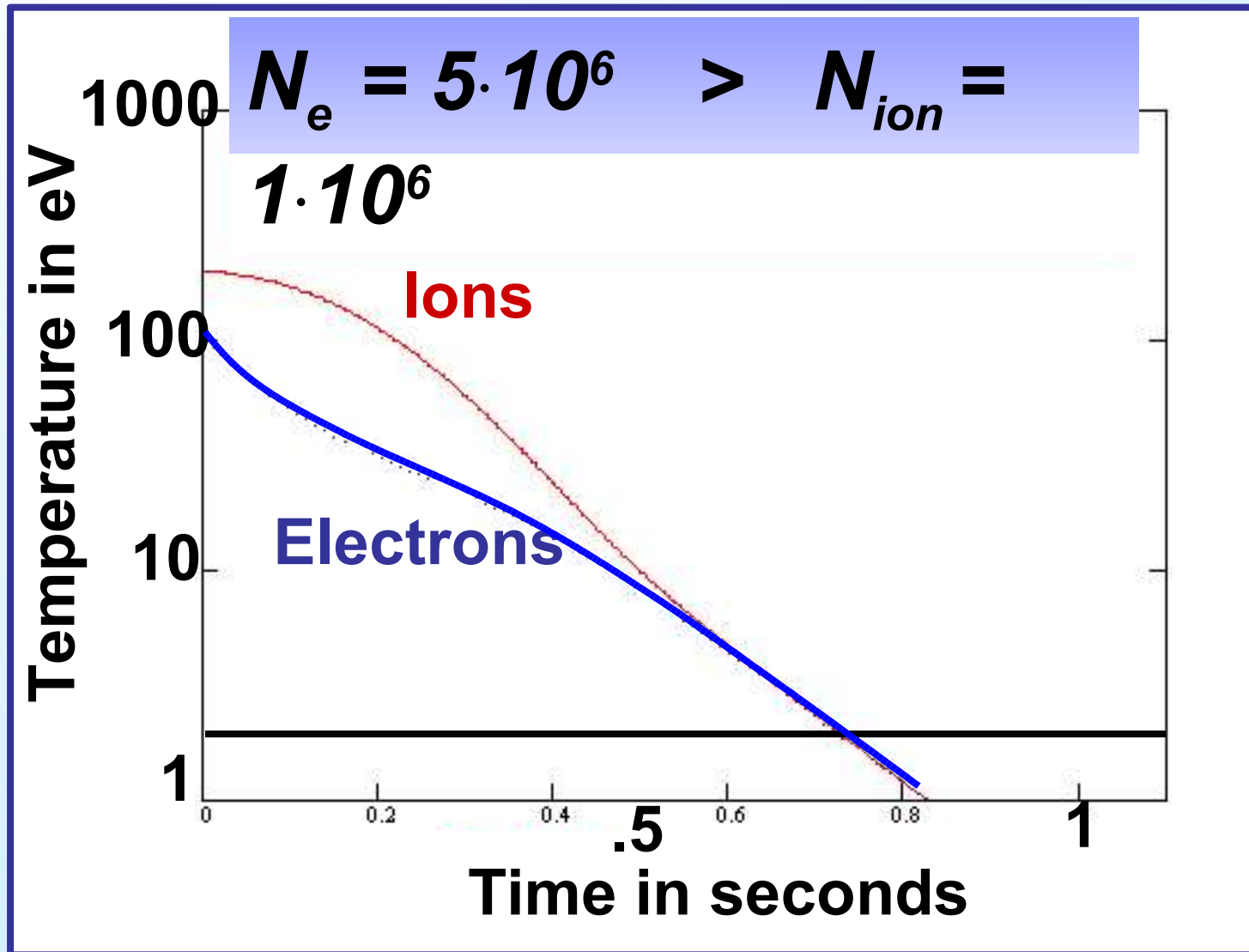
\longleftrightarrow *Doppler line broadeni*

$k_B T_i = 350 \text{ eV}$

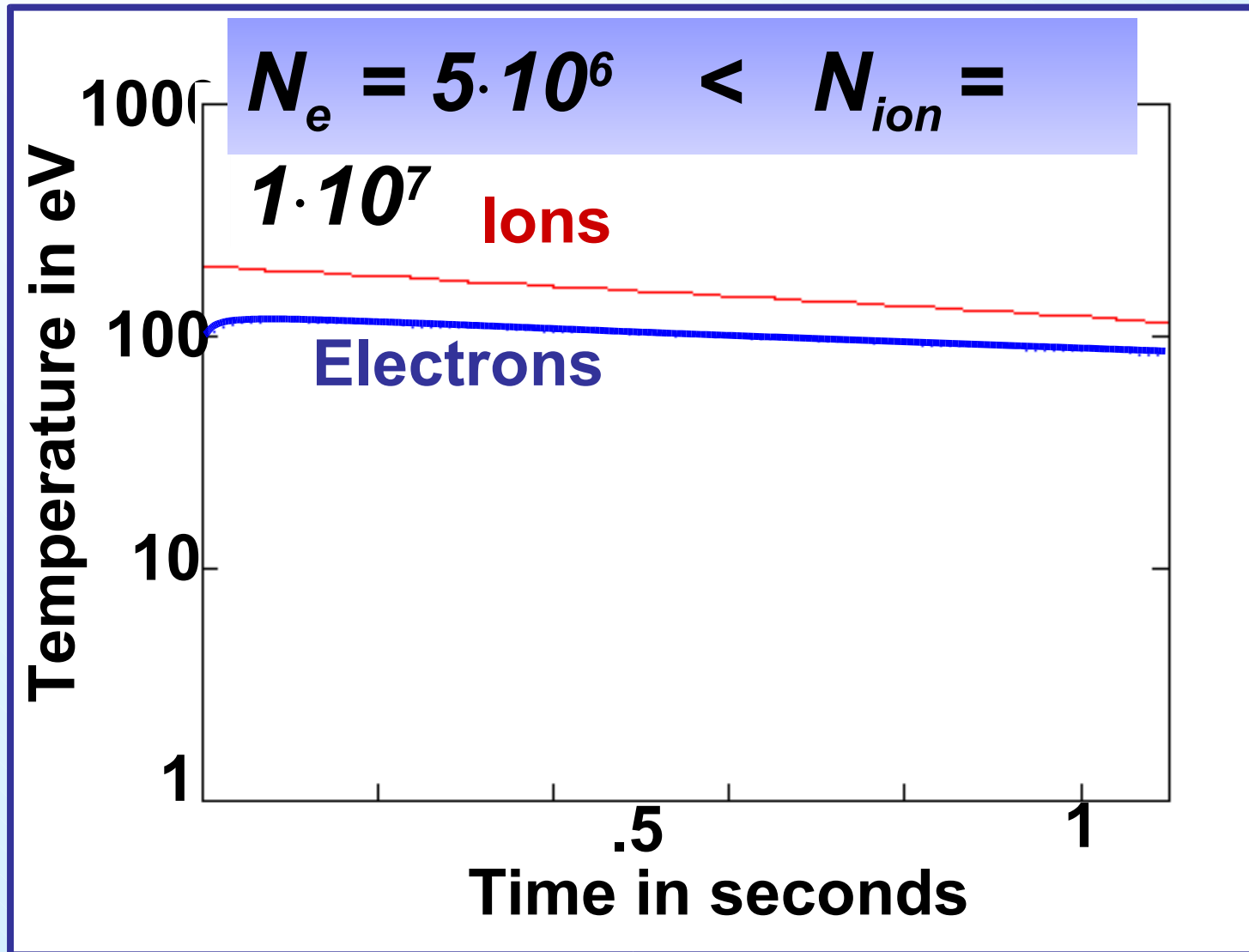
Synchrotron cooling time at 8 T: 56 ns

Hot ions serve as heat reservoir !?

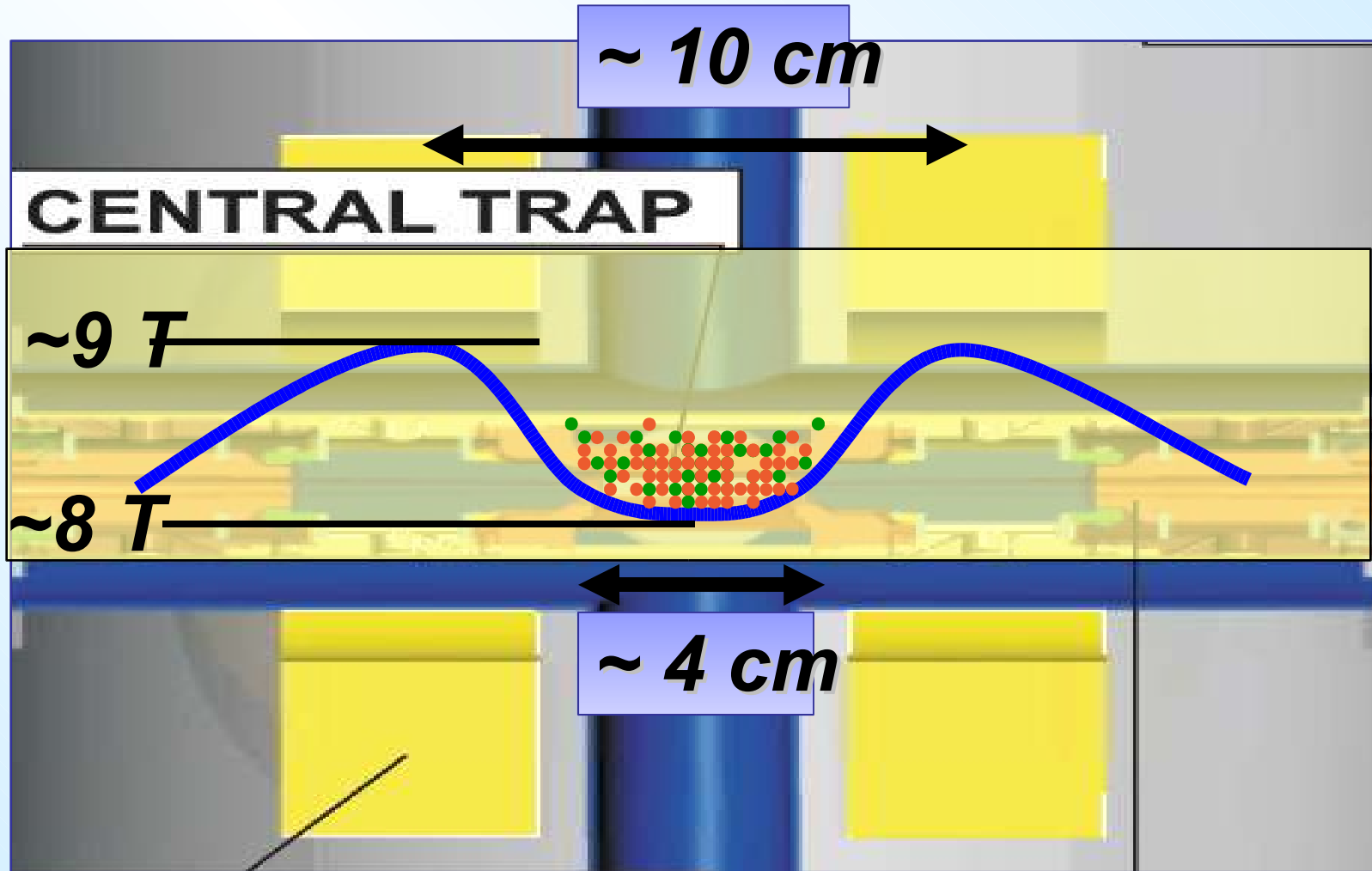
e- impact excitation



e- impact excitation



Magnetic Trapping?

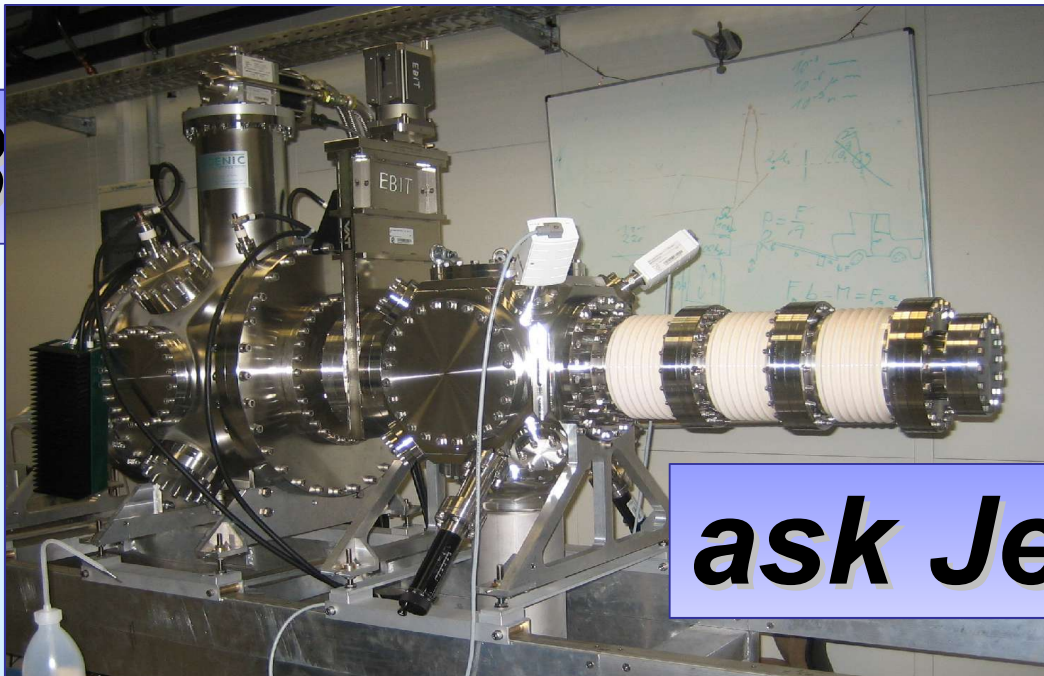


Possible new explanation: Magnetic bott

Possible Proves:

Radiative recombination

$$kT_e = 50 \text{ eV}: 10^{-4} \text{ sec}^{-1} !$$



B

oling !

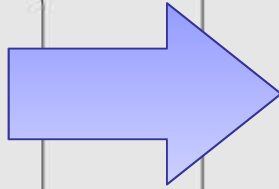
ask Jens Dilling

Laser-Spectroscopy

LASERLABOR

EBIT LABOR

Nd:YAG



*ready to go !
isotope shifts, HFS,*

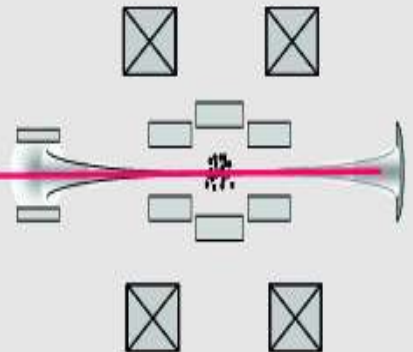


Einkopplung



32

EBIT



Possible Proves:

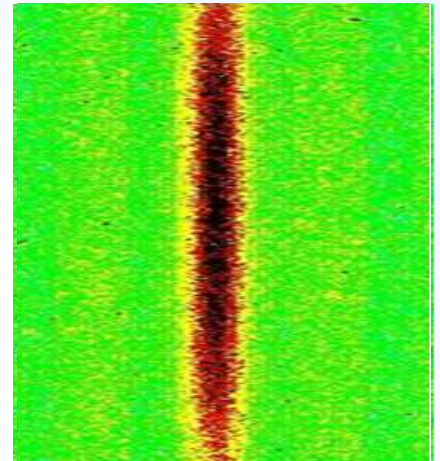
Radiative recombination

Extract electrons and count

Laser assisted recombination

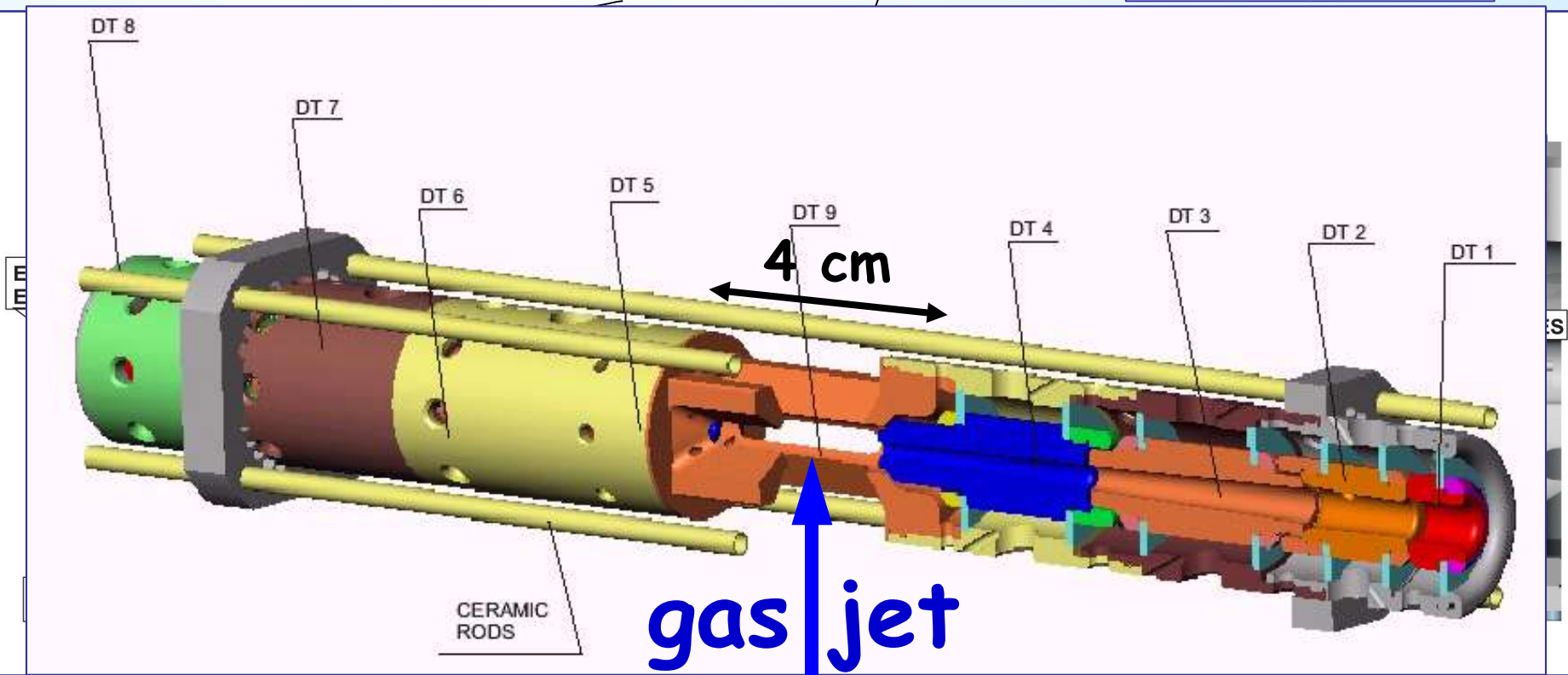
Imaging of ion cloud

Ar^{93+}



Fun Part:

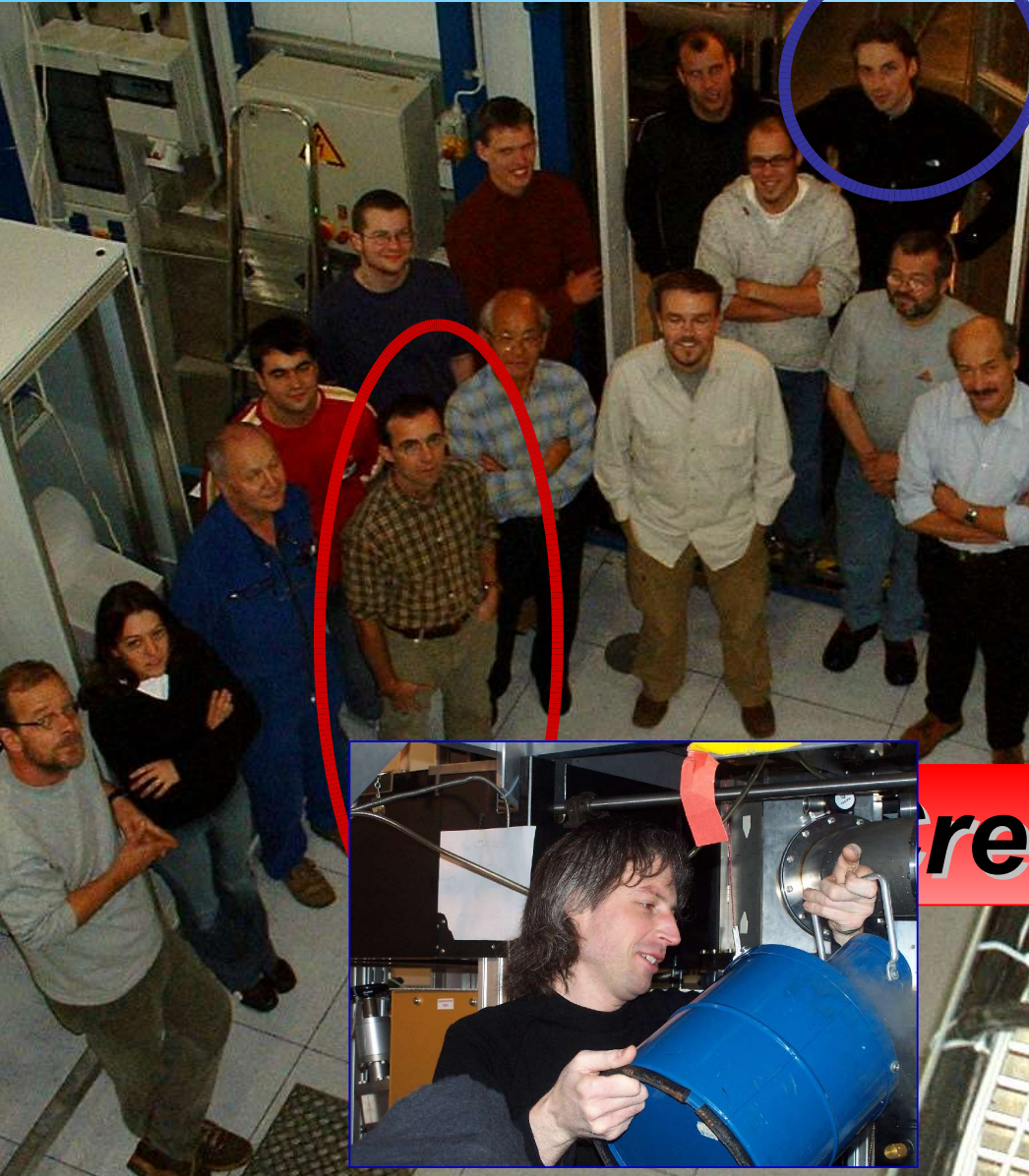
Gas jet: P_{bar} + Atoms U^{8+}



Spectroscopy, DR_{\rightarrow} ?

The EBIT Group

Alain Lapierre



respo

End