

PWIE SP X2 PROJECT
CORIA-CEA LIBS Activity
Double pulse ps-ps LIBS measurements

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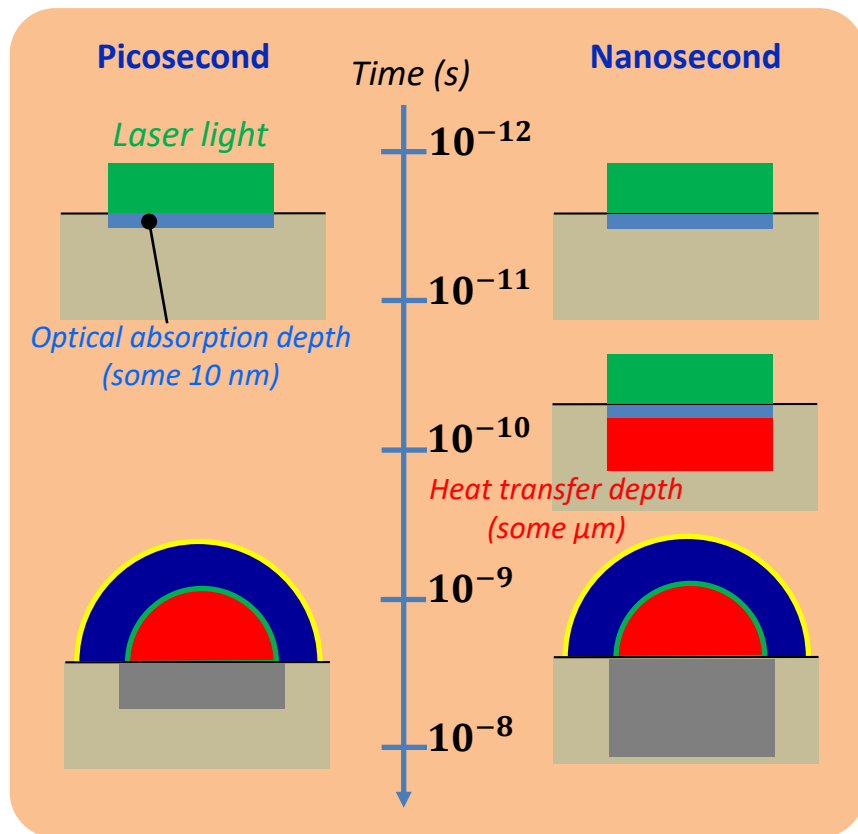
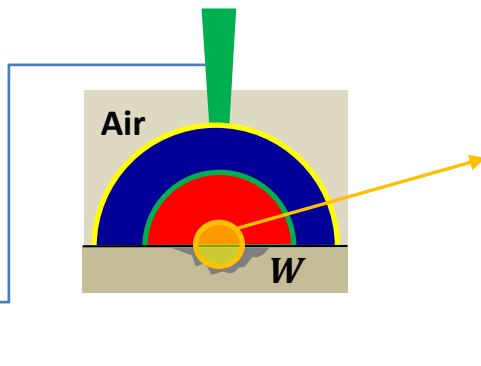
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Why DP ps-ps LIBS?

Reduction of the ablation rate

Atoms A to be measured?.....H - D - T
 Type of sample?.....W - Al - SS316L - Be
 Mole fraction values x_A ?..... $0.1\% < x_A < 10\%$
 Depth δ of the measurement?..... $0 < \delta < 10\ \mu\text{m}$
 Tokamak conditions..... $p \sim 10\ \text{Pa}$

Nanosecond
 Picosecond



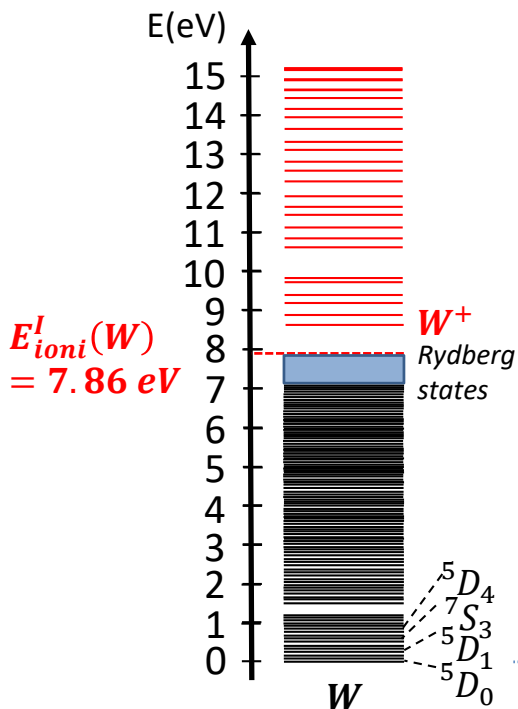
Lower ablated mass
 Weaker signals
 Better for profiling

Higher ablated mass
 Stronger signals
 Worse for profiling

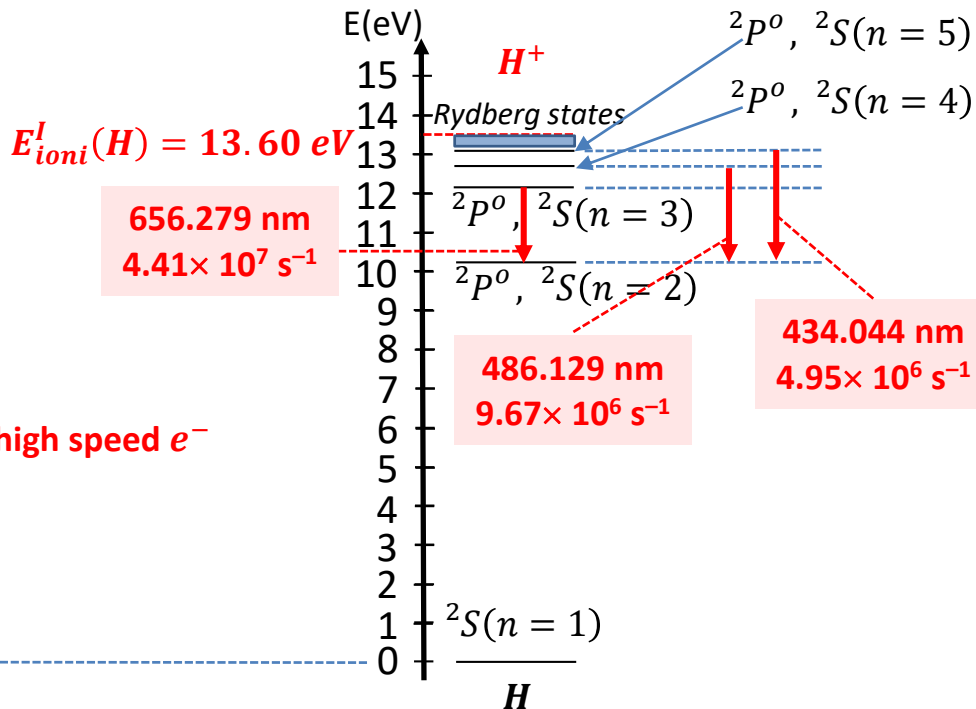
Why DP ps-ps LIBS?

Difficulty to populate hydrogen or isotopes excited states responsible for the Balmer series lines

W energy diagram



H energy diagram

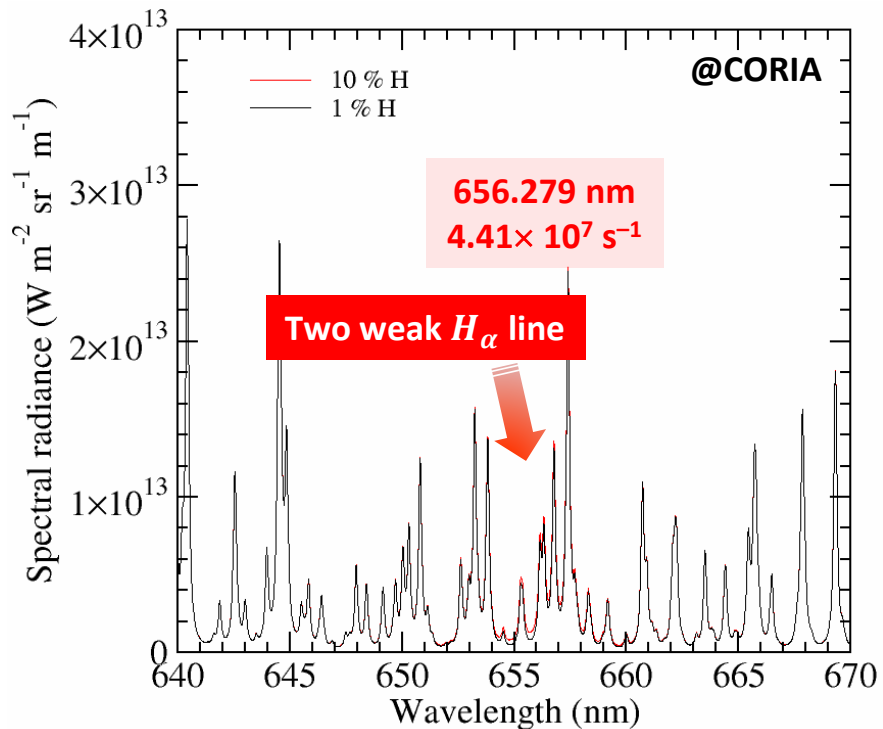


Promising solution for the measurement of Helium

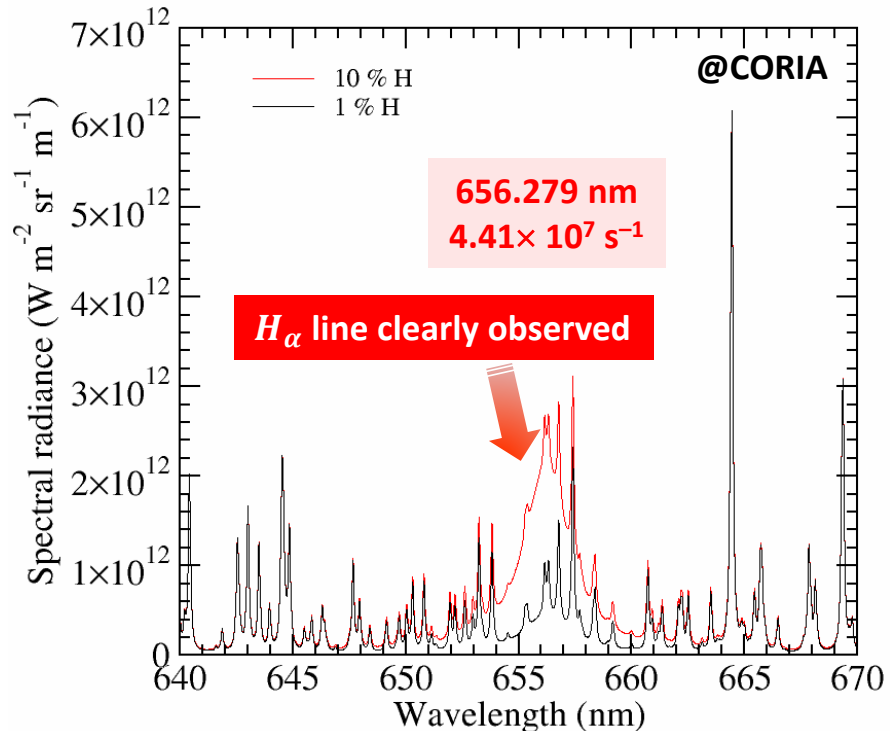
Why DP ps-ps LIBS?

Need to increase the population density of the upper state of the transitions

$T_e = 10\ 000\ K$



$T_e = 13\ 000\ K$



Example of calculations performed with the MERLIN code

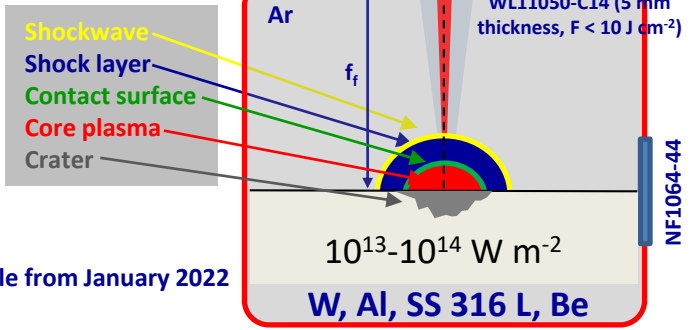
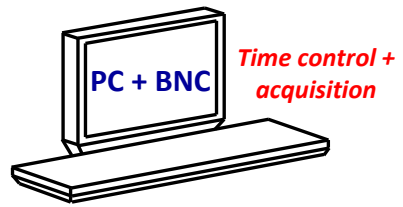
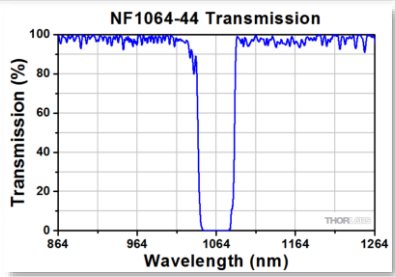
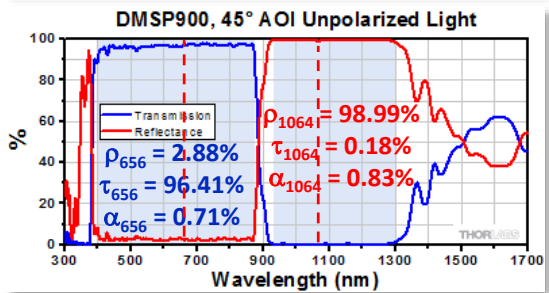
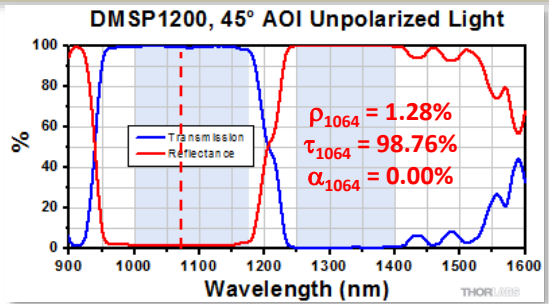
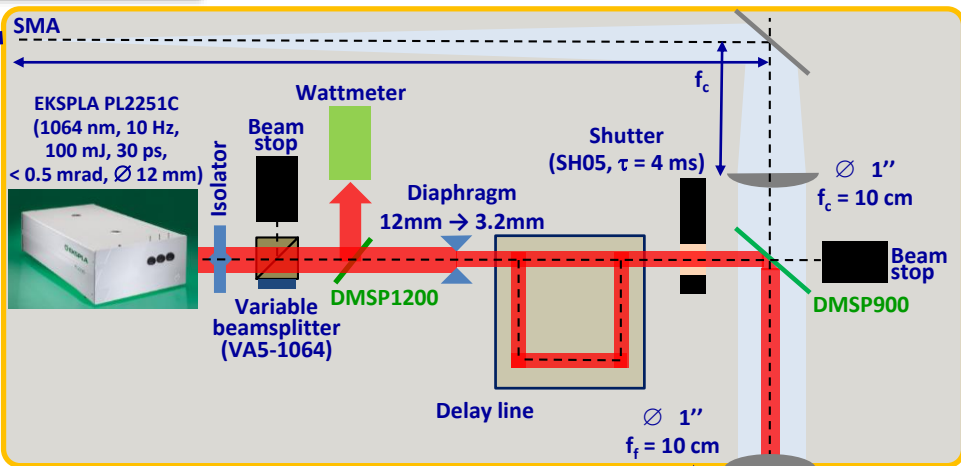
(based on the resolution of the Radiative Transfer Equation in LTE conditions)

DP ps-ps LIBS experiments

LG-455-020-3
(3 m, NA 0.22)
19 fibers \varnothing 200 μ m
Circular \varnothing 1.3 mm \rightarrow
linear

LTB Echelle
ARYELLE Butterfly

IStar-ICCD



Experiments on Be will be possible from January 2022