

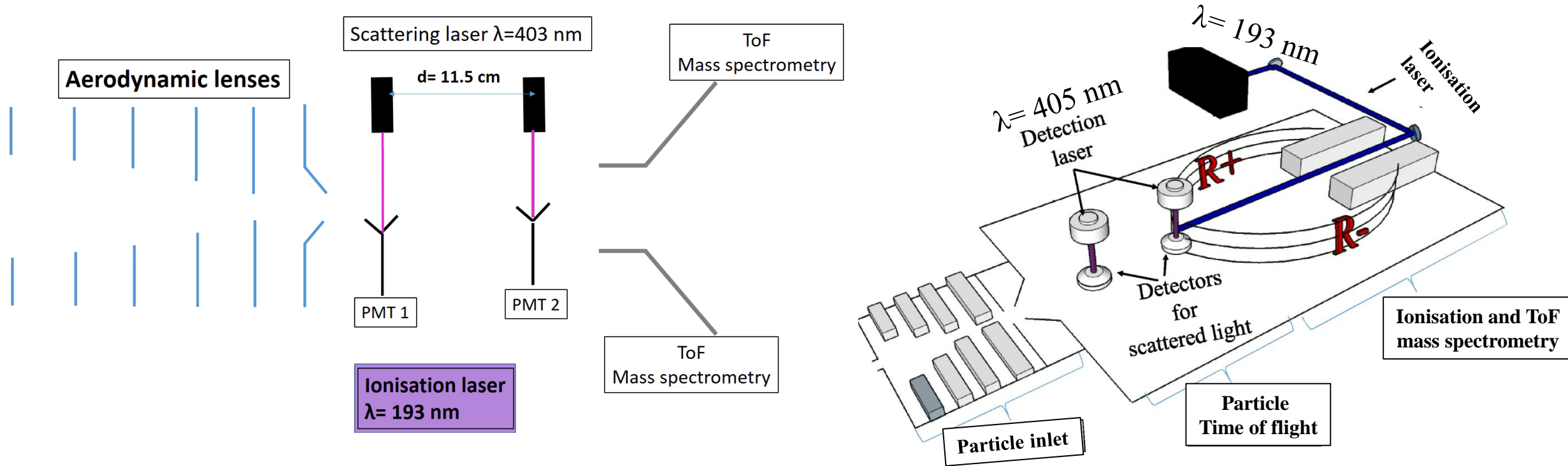
## Quantification of organic and inorganic compounds within the ambient particles by LAAP-ToF-MS

Presented by : Rachel GEMAYEL

Supervisor: Sasho GLIGOROVSKI

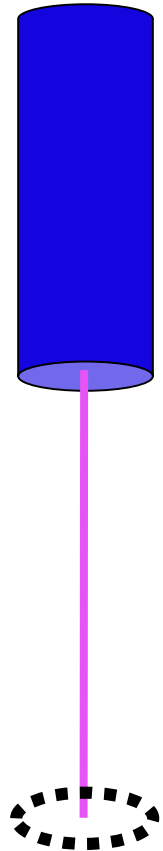
Henri WORTHAM

## LAAP-ToF-MS Working principle

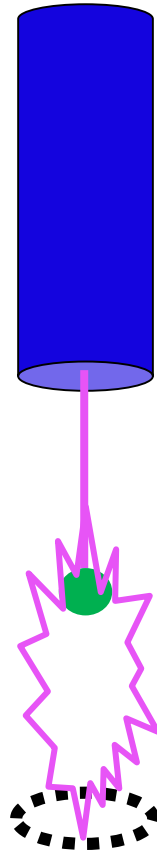


# CHALLENGE (scattering laser)

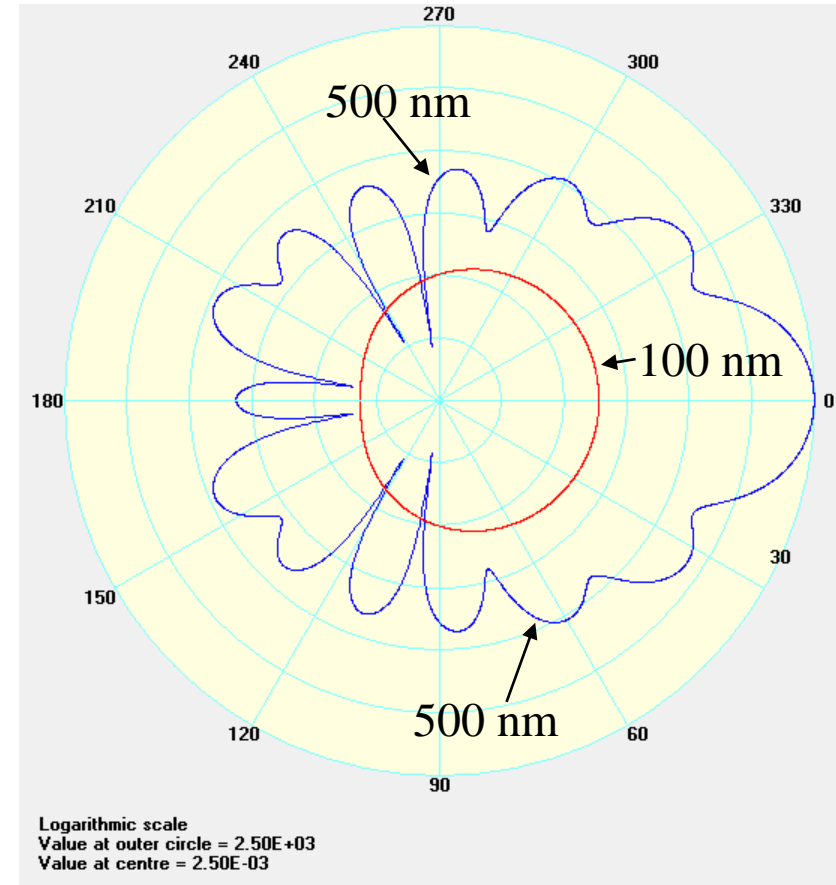
Initial state



Scattering state

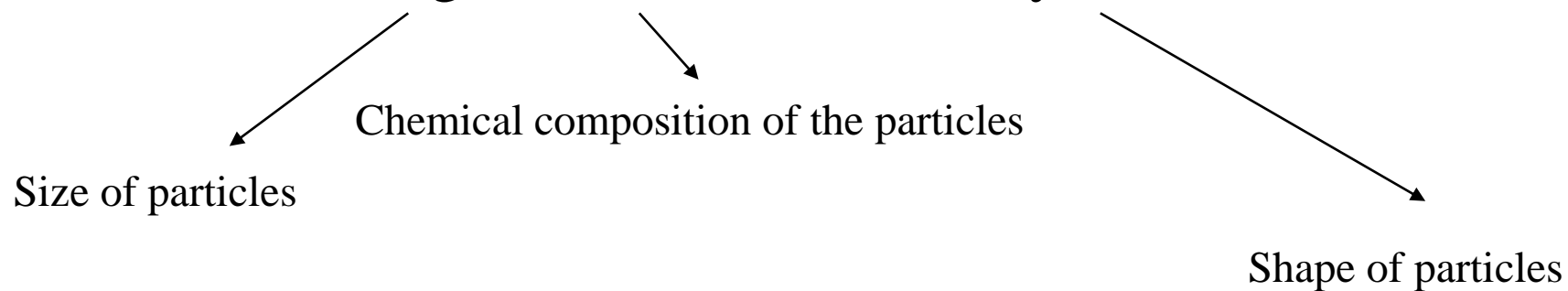


$\lambda = 403 \text{ nm}$

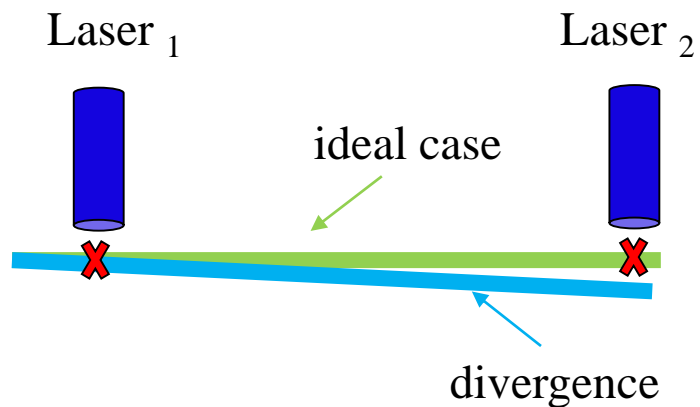


# CHALLENGE (scattering laser)

Scattering laser is influenced by:

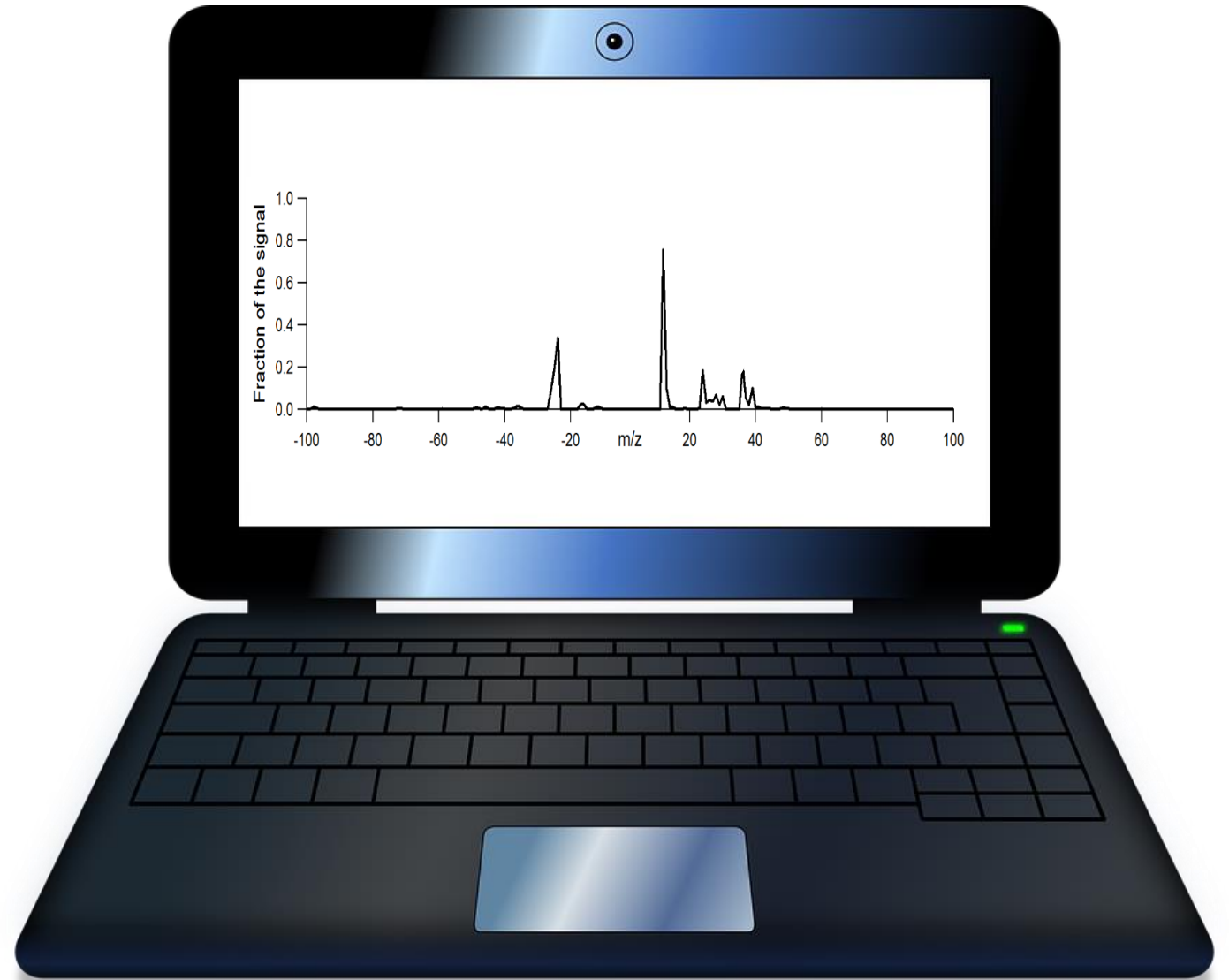
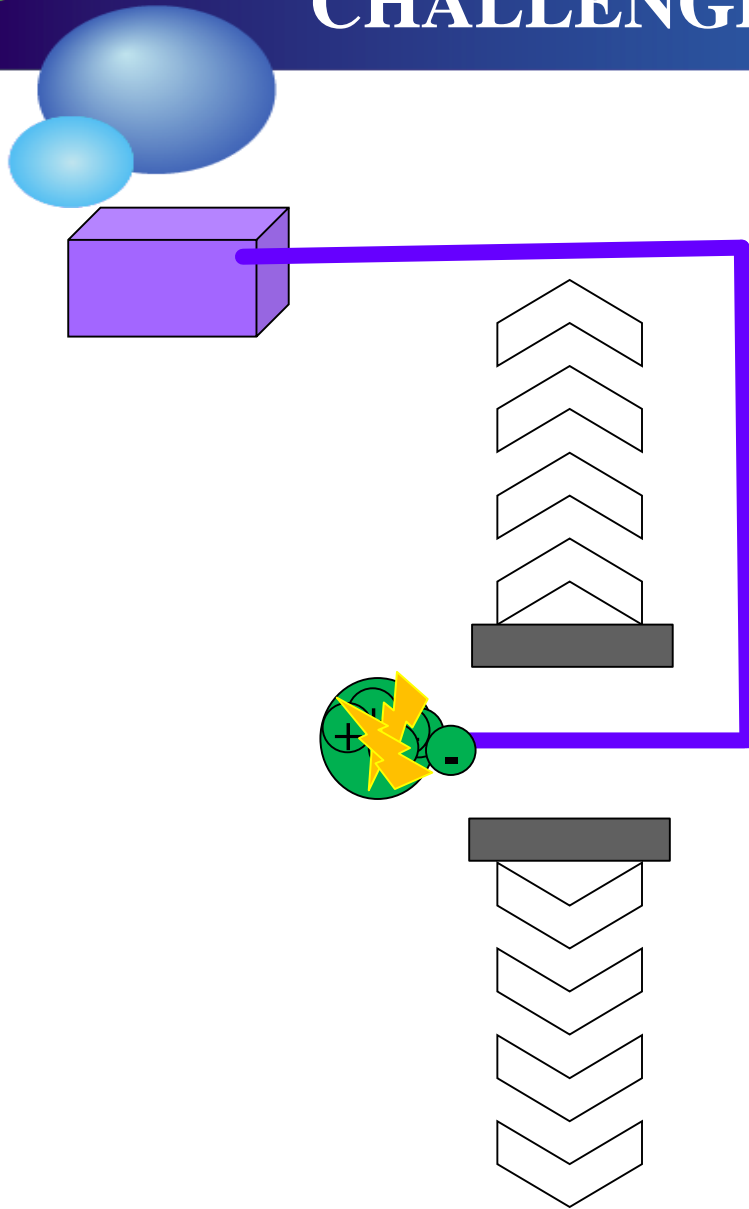


2D representation



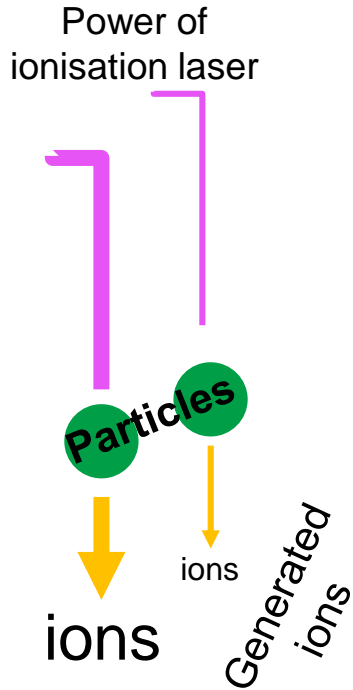
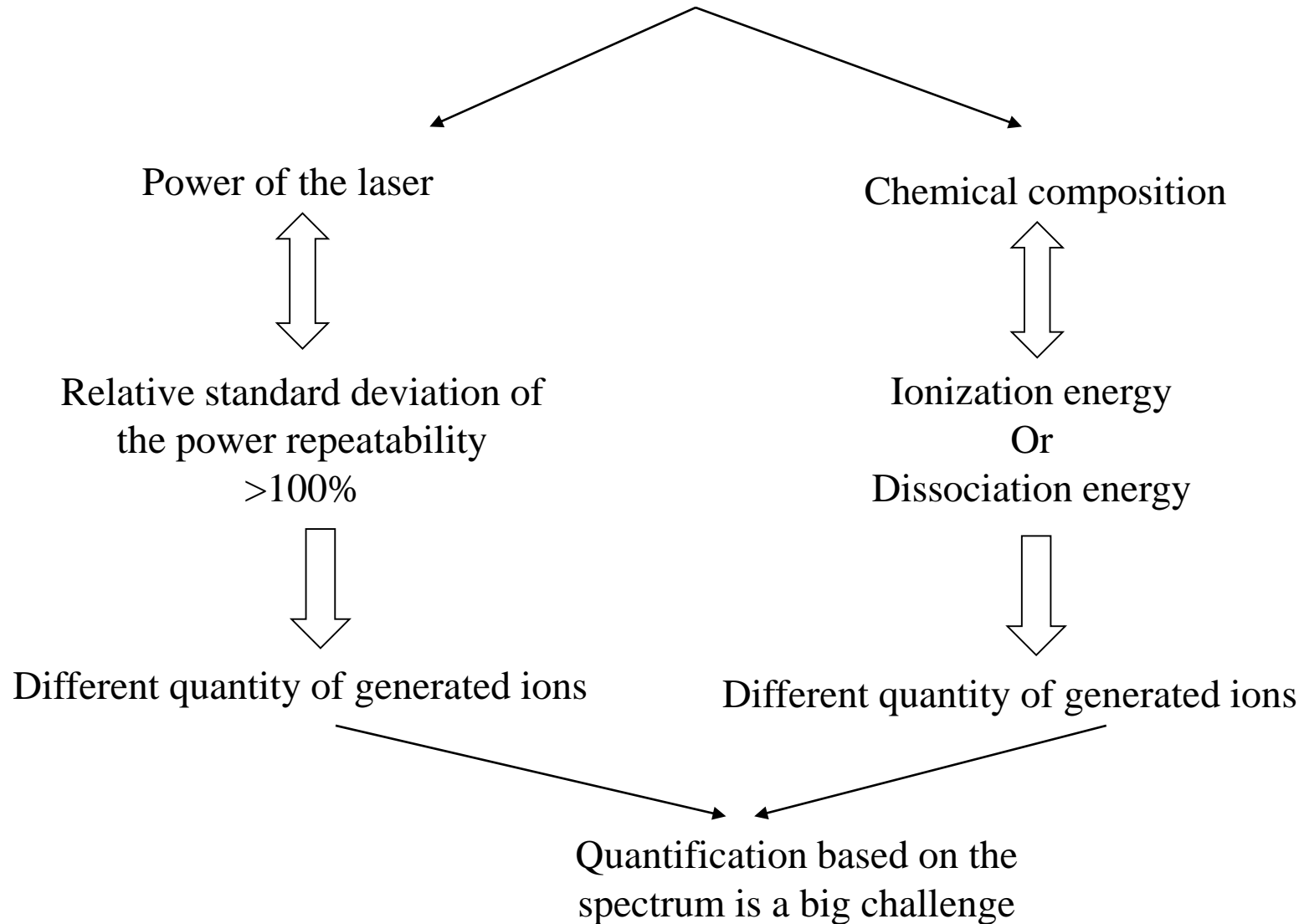
Influence also the divergence between the two scattering laser

# CHALLENGE (ionization laser)



# CHALLENGE (ionization laser)

ionization is influenced by:





## Field campaign



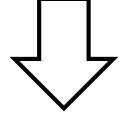
The duration of the campaign was:

10 days

19 January ... 29 January

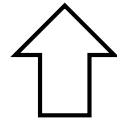
## Field campaign

### MAAP

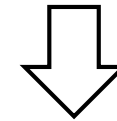


Total mass for elemental Carbon

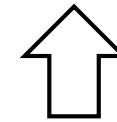
Different mass concentrations by size range for nitrate, sulphate, chloride and organics.  
Total mass for ammonium



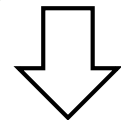
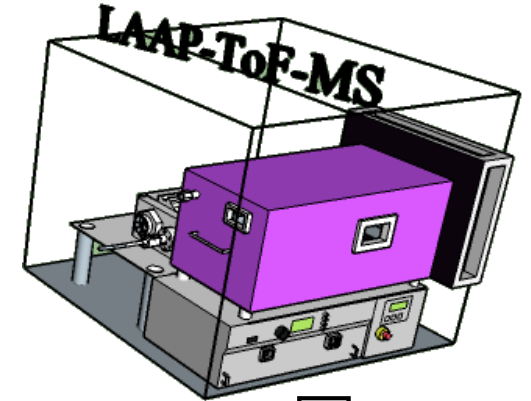
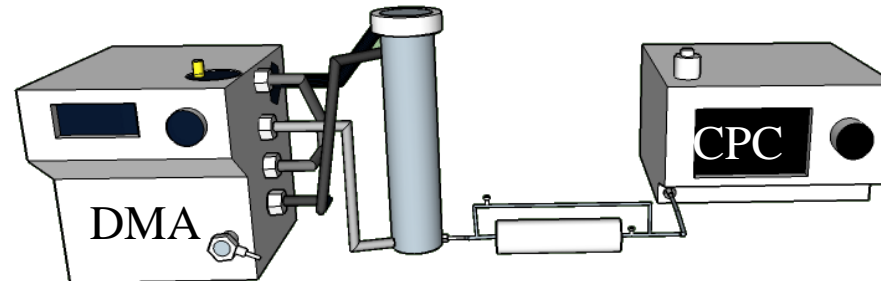
### HR-TOF-AMS



granulometry



SMPS



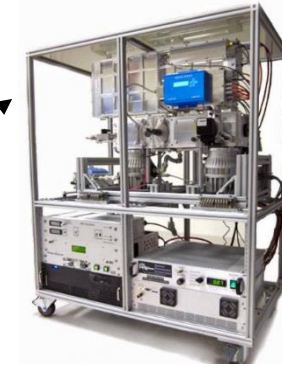
Different number concentrations by size range



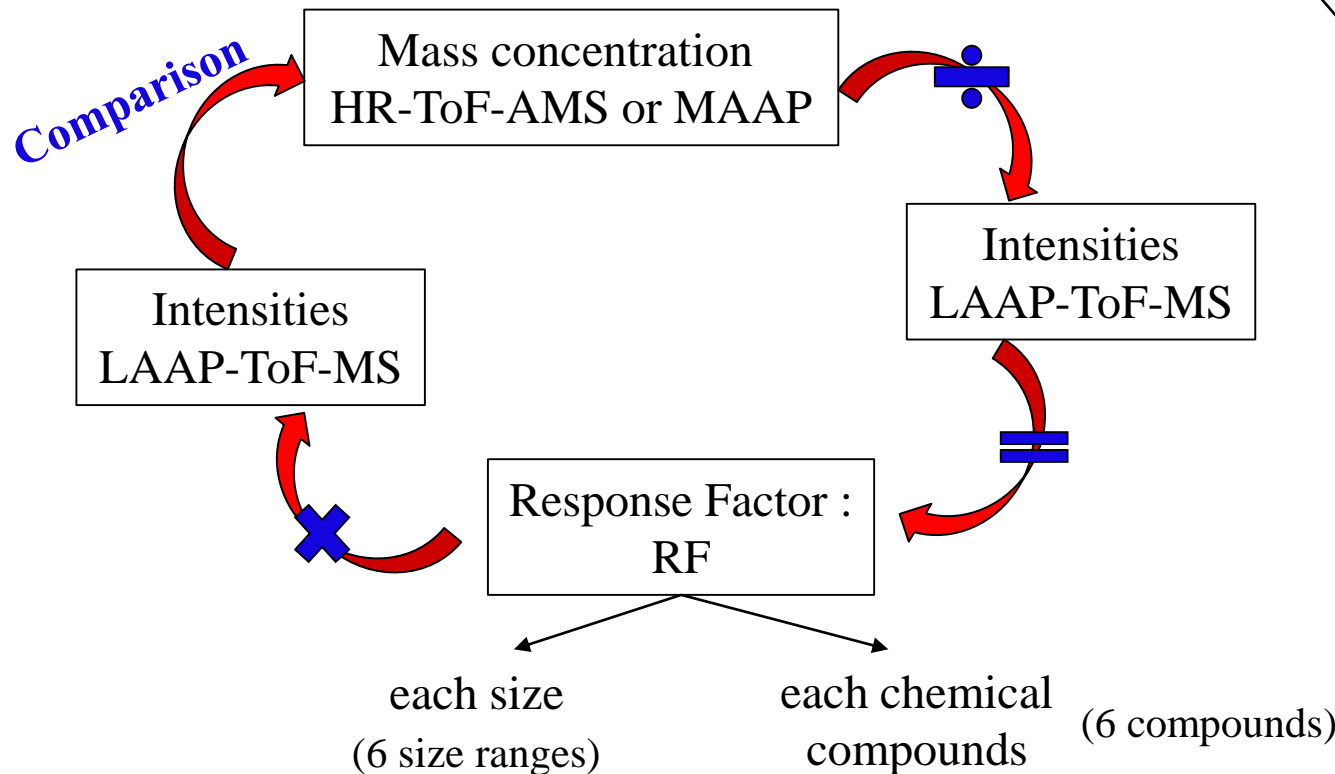
## Calculation

# Response factor by size range

$$= \frac{\text{Average of mass concentration}}{\text{Average of specific ion intensity}}$$



OR



## Results

The collection efficiency of the dry, solid ammonium sulphate particles is  $24 \pm 3\%$  for the HR-ToF-AMS while it is 100% for Liquid droplets and solid particles that were thickly coated with a liquid organic.

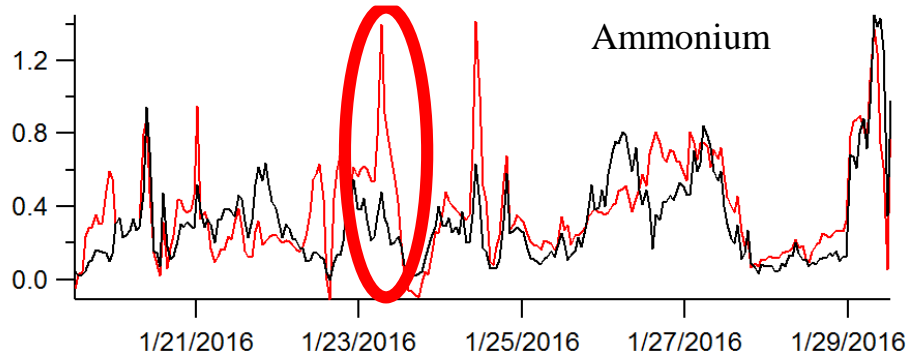
The ion formation threshold with the LAAP-TOFMS for  $\text{NH}_4\text{NO}_3$  is very low in comparison to the other combination of species

HR-ToF-AMS

LAAP-TOFMS

Mass concentration [ $\mu\text{g m}^{-3}$ ]

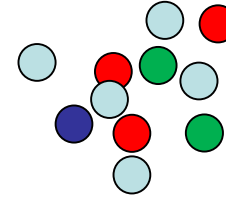
Mass concentration [ $\mu\text{g m}^{-3}$ ]



## The importance of the methodology

1

Number concentration for different classes of particle



2

Mass concentration (or semi quantitative) of different compounds for the same classes



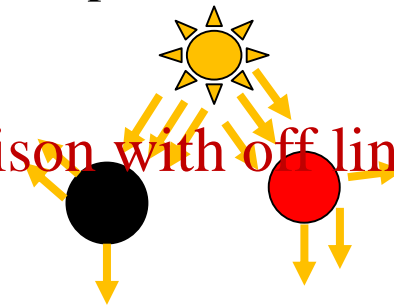
3

The participation of different compounds to the particles

Reactivity in the atmosphere

Impact on the climate

Quantify the mass concentration of heavy metals by comparison with off line measurements.



THANK YOU FOR YOUR ATTENTION