

# The Study of Wien Filter for Gas Cluster Ion Source

Byoung-Seob Lee\*, Jonggi Hong, Jung-Hwan Kim and Myoung Choul Choi

Korea Basic Science Institute, Korea



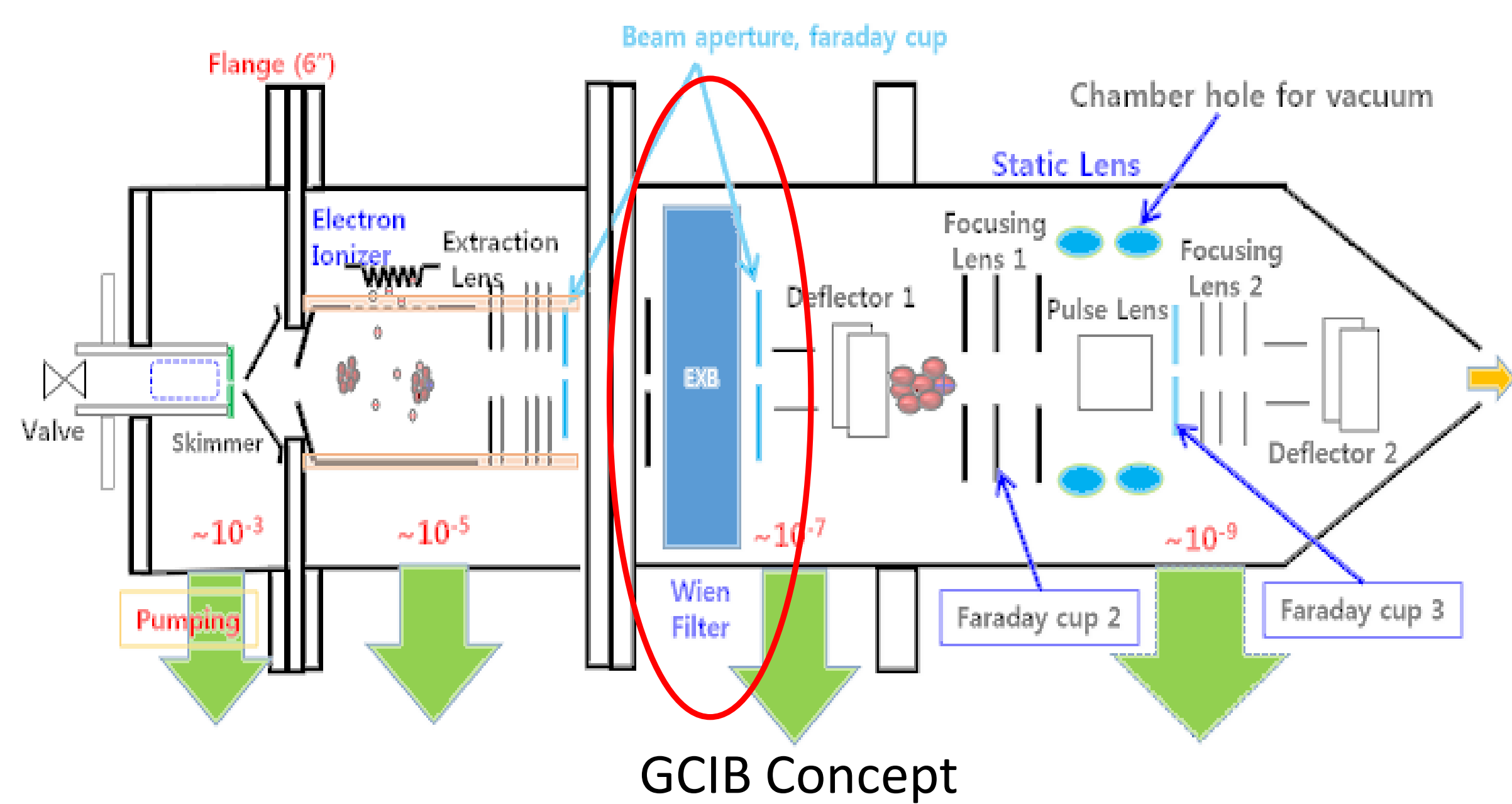
ID: 213  
bslee@kbsi.re.kr

## Abstract

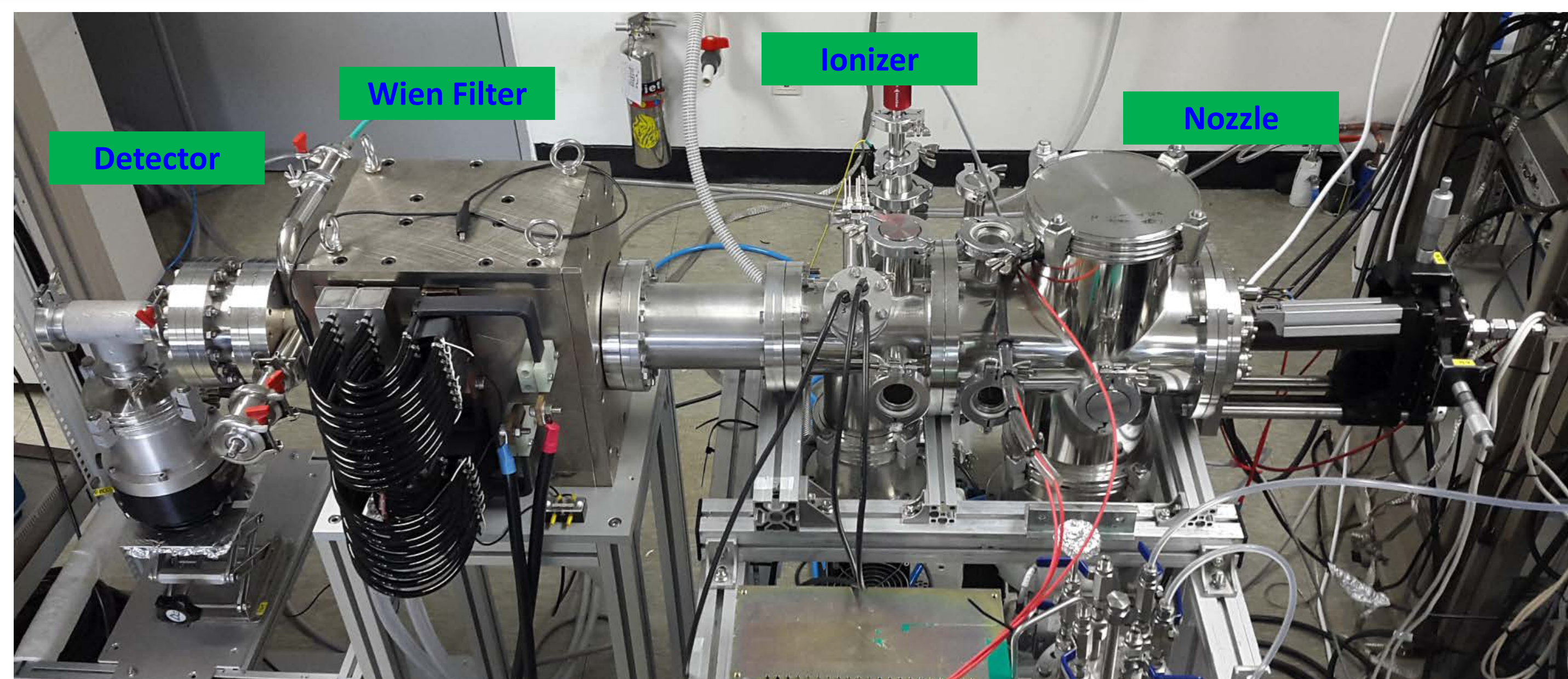
The Korea Basic Science (KBSI) is developing a Gas Cluster Ion Source (GCIS) for X-ray Photoelectron Spectroscopy (XPS) and Secondary Ion Mass Spectroscopy (SIMS) since 2014. The experimental system was installed for generation of argon gas cluster ion beam using GCIS which consists of cluster generator, ionizer, Wien filter, accelerator, micro lens and target. For analysis of gas cluster ion beam, we had manufactured a Wien filter with wide range. From experimental results of Wien filter with wide range, a compact Wien filter for GCIS beam line was developed. In this paper, feasibility design studies of Wien filter related to analysis of cluster ion beam are exposed.

## Motivation and objectives

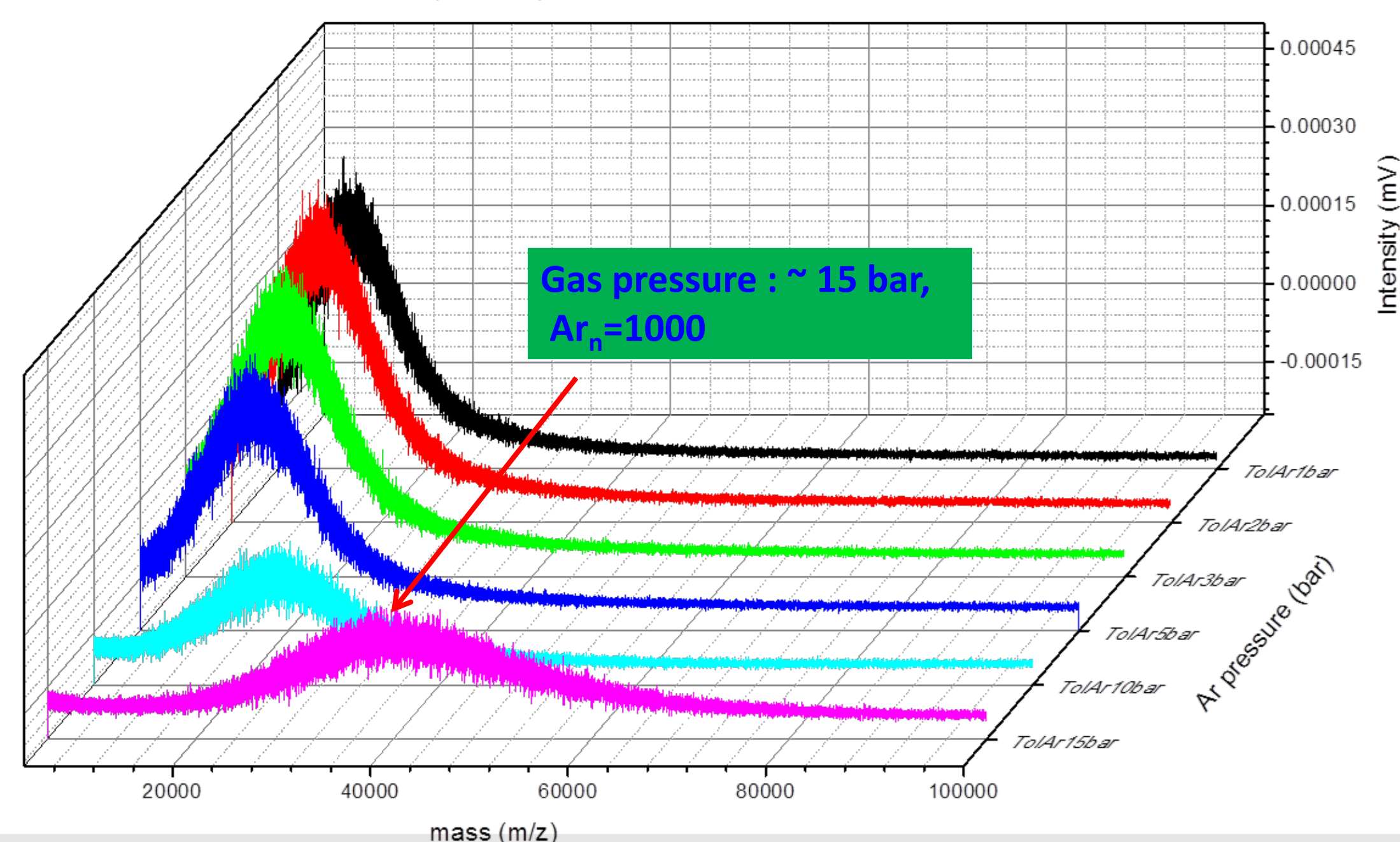
- Wien filter, a component of charged particle separation, is well known methods like a analyzing dipole magnet.
- Complex structure but need short space for installation.
- Distinguish until Ar 2500+ by using Wien filter and collimator.
- For simple structure of surface analysis equipment, a space of the Wien filter is limited by 30 cm.



## Development of GCIB and Wien Filter

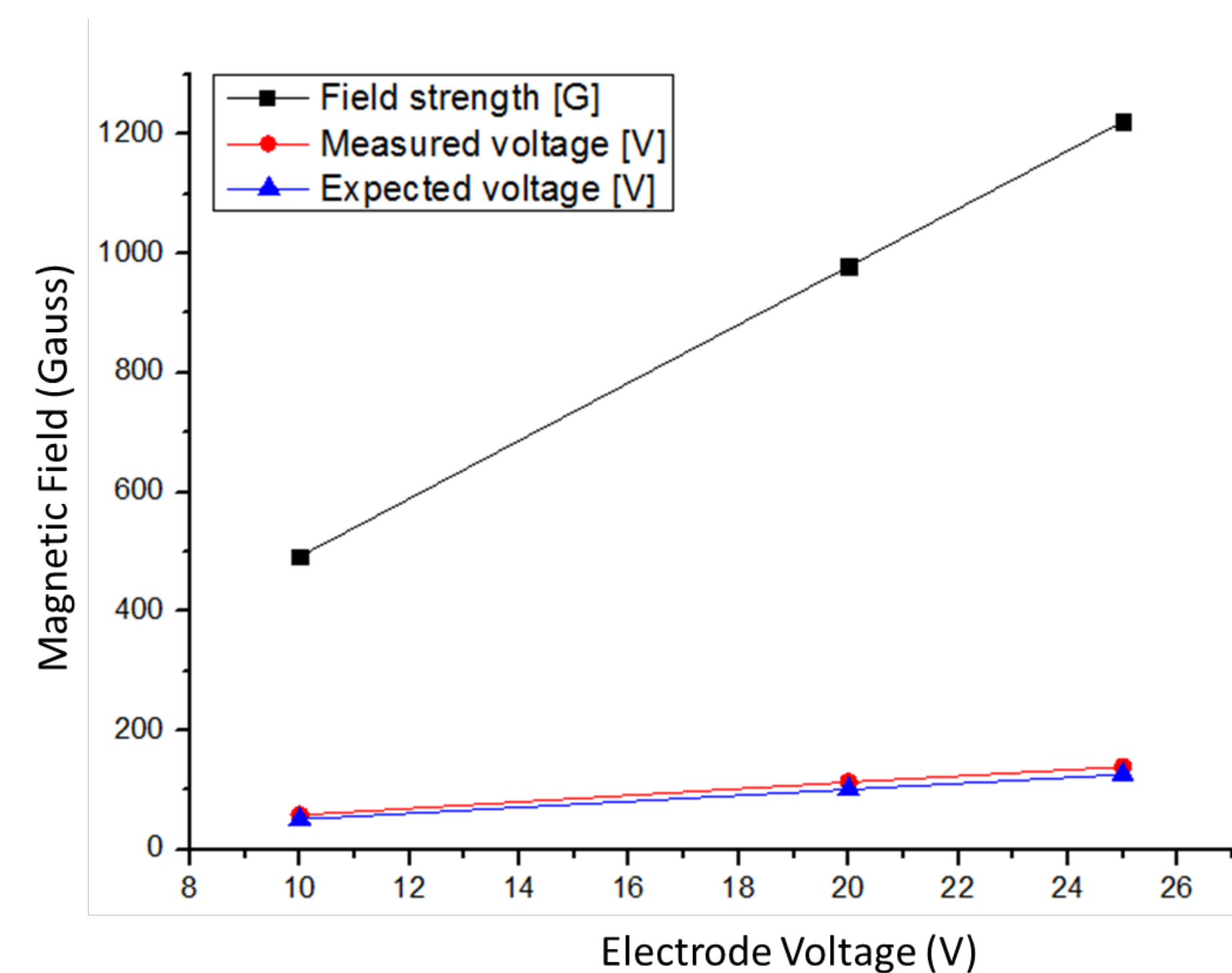


Toluene-Ar<sub>n</sub> clusters generation as a function of Ar pressure (1-15 bar)

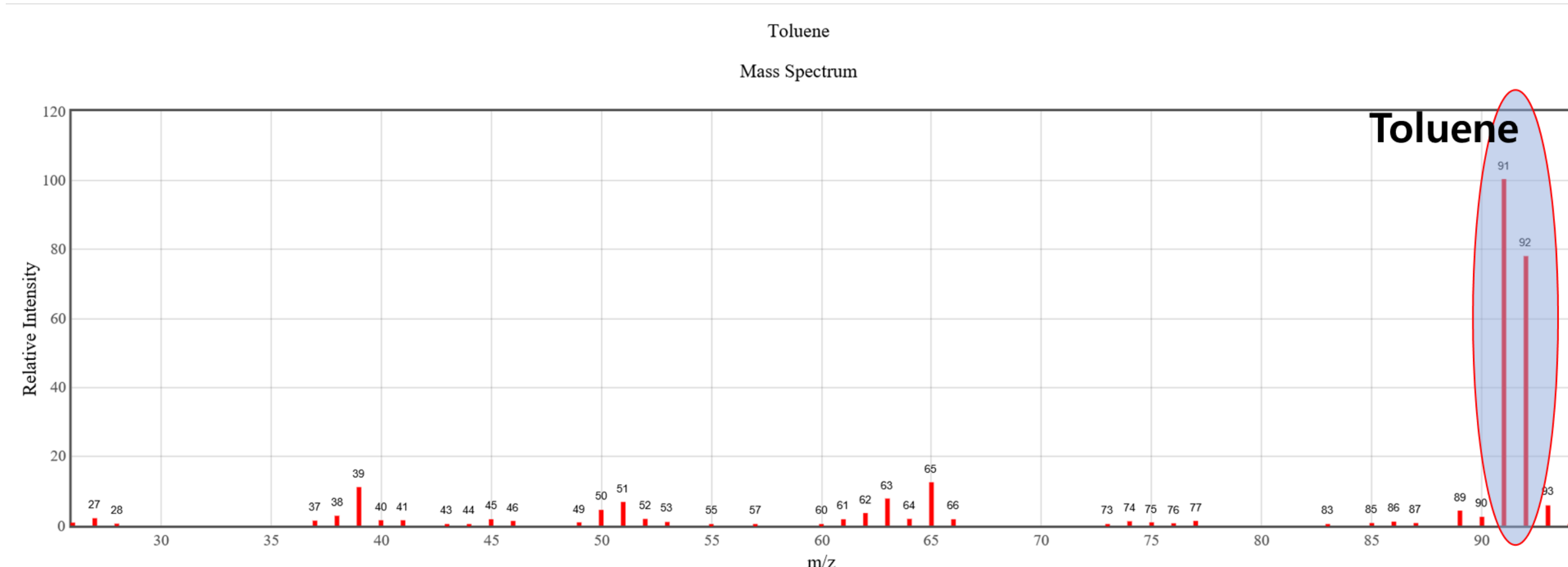


## Experimental results of Wien filter

- In last year, we had confirmed electric voltage after installation of Wien filter. Measured values were matched expected voltage.



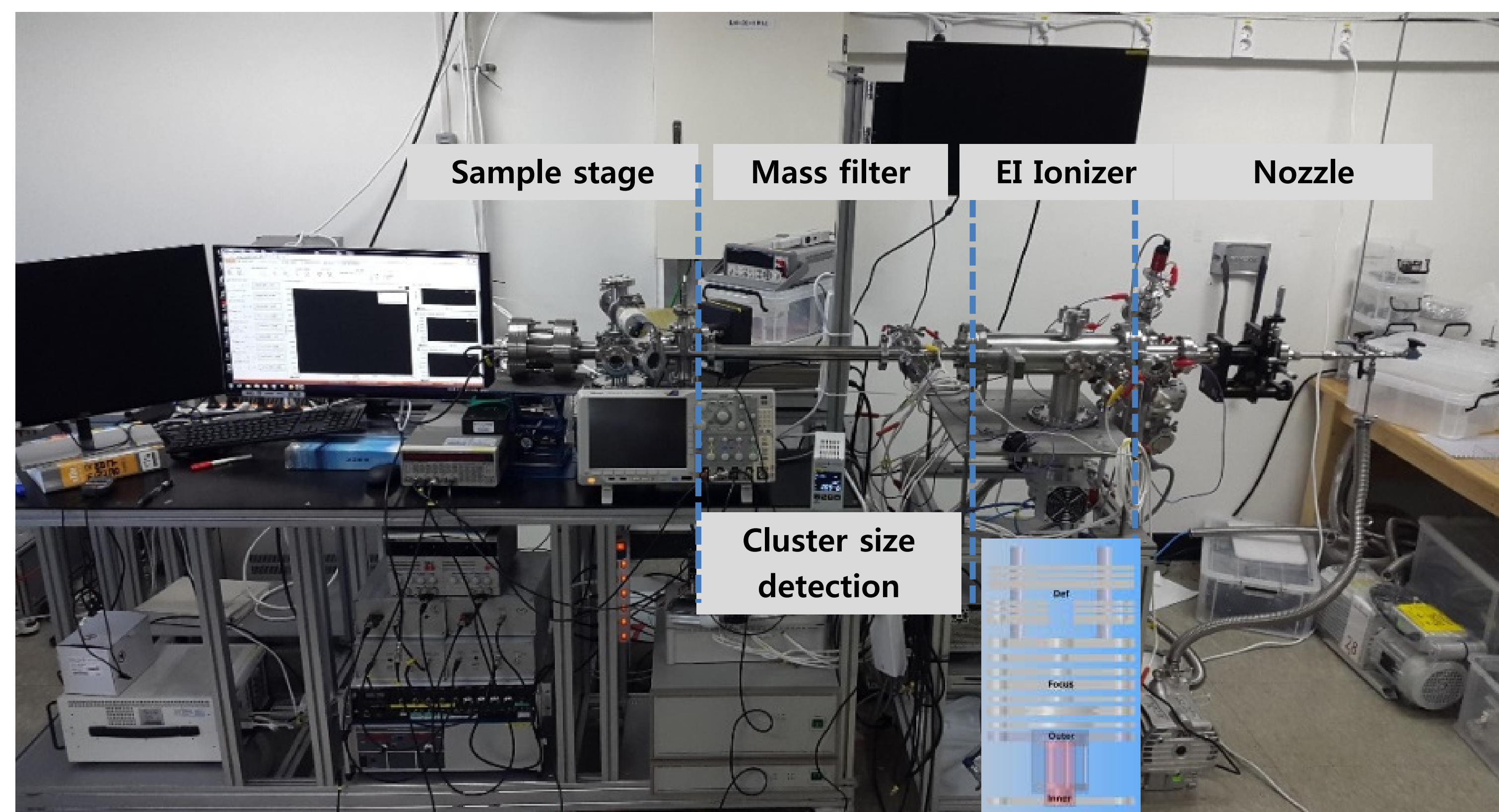
- For confirm separation of cluster, We had performed to distinguish between toluene 91+~92+ and the other clusters.
- Gas : Toluene Z=91, 92
- Extraction voltage : 5 kV



ID	Magnet current [A]	Field strength [G]	Electrode voltage [V] -Experiment-	Electrode voltage [V] -Expectation-	Error [%]
1	10	492	57.9	50.6611	14.28
2	20	978.6	113.0	100.766	12.14
3	25	1221.7	138.8	125.798	10.33

## Development of compact GCIB

- GCIB for SIMS need more compact size than current system. In this year, we installed GCIB test bench for experiment of compact size



- Also, we designed chamber and electrode for compact Wien filter with 20 cm effective length which use permanent magnet.

