PFEIFFER VACUUM

RESIDUAL GAS ANALYSIS IN A UHV-APPLICATION GENERATED BY TURBO PUMP IN COMBINATION WITH DRY BACKING PUMP

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- Generation of UHV
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  - UHV generation with Turbo pumps
- Experimental Results
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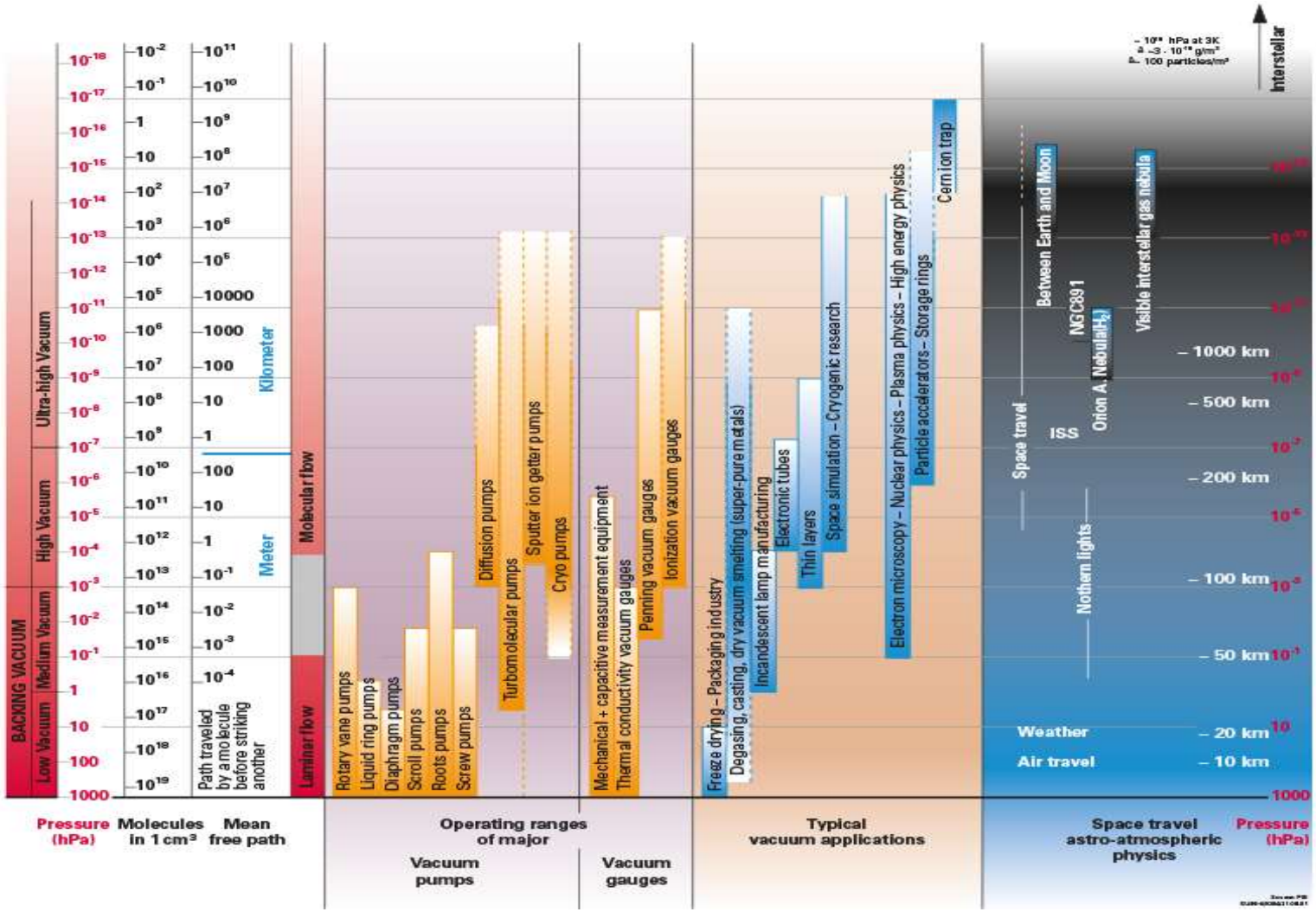
- Summary

Requirements

- No Hydrocarbons
- Low maintenance
- Smaller number of pumps
- High compression ratio for Hydrogen

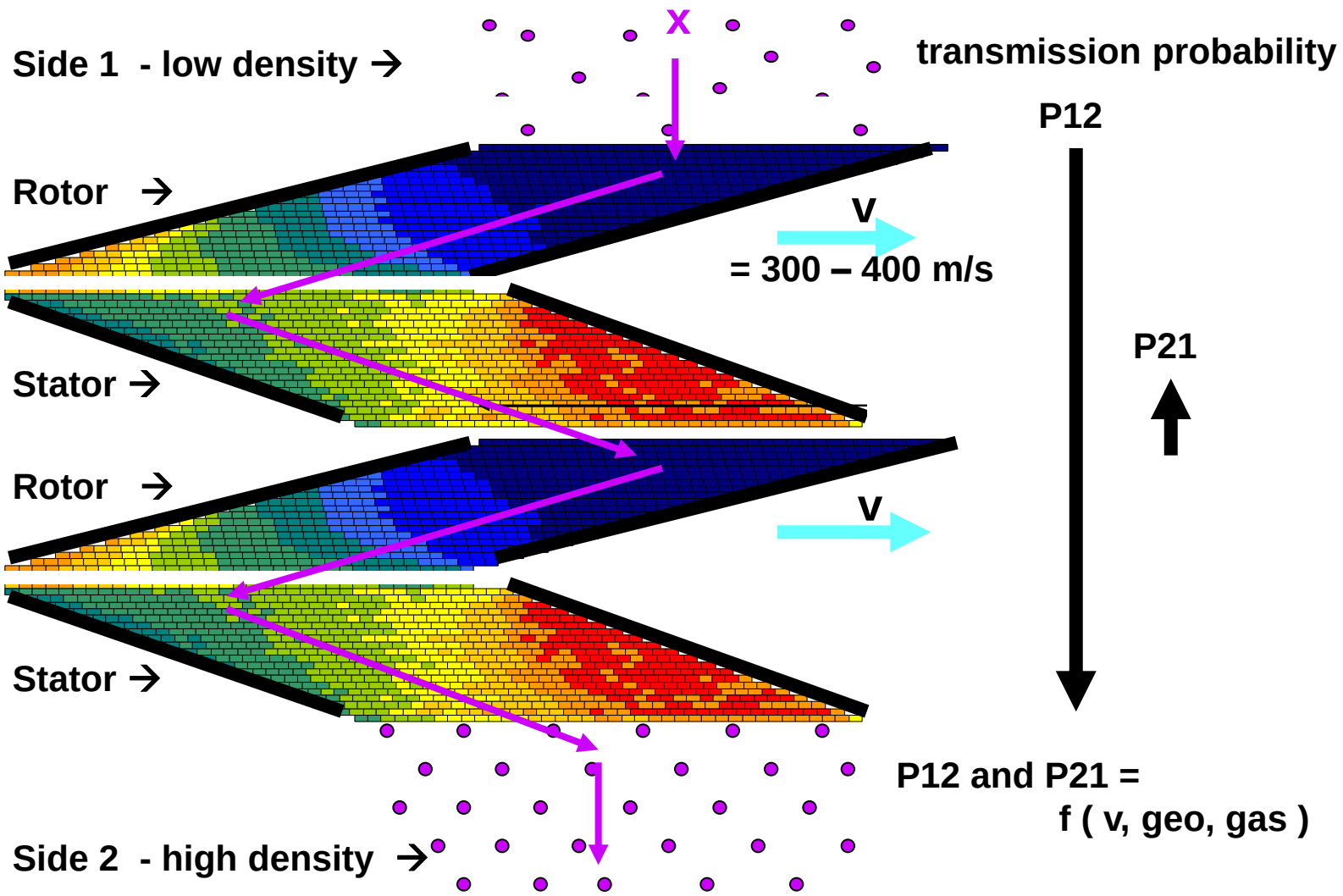
Vacuum Regimes



Vacuum Chamber for UHV

- Stainless Steel
  - Designed for UHV e.g.
    - No virtual leaks
    - low flow restriction
- Metallically sealed
- Surface treatment
  - Electro polished
  - Cleaned
- Leak checked
- Bakeable T > 120 ° C

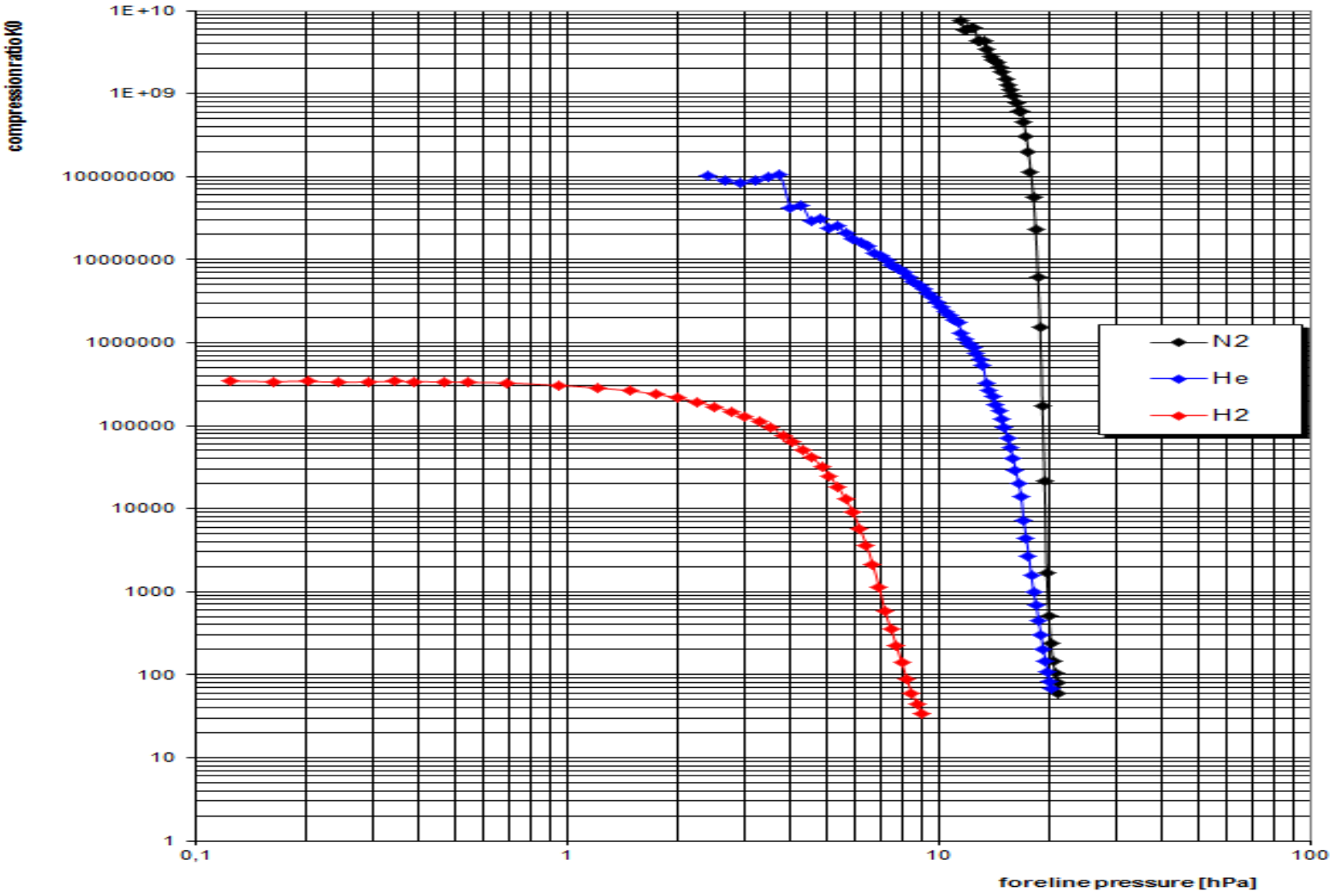
Theory of turbo- pumping effect



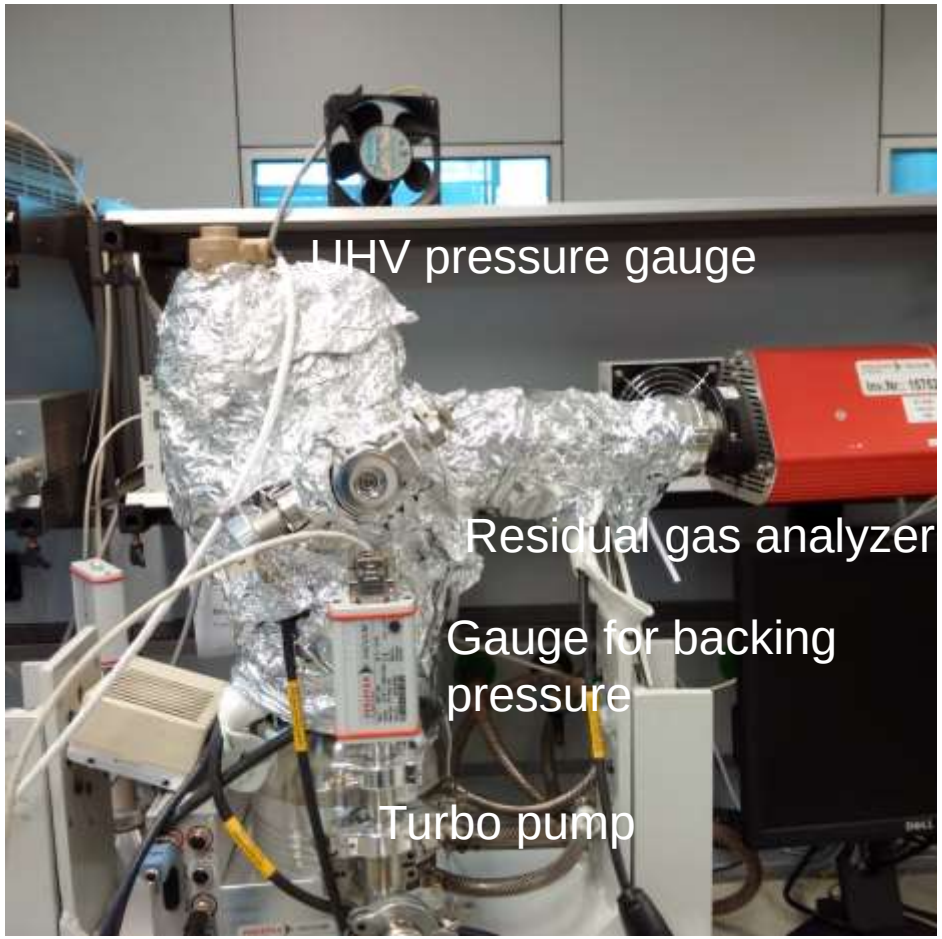
Technical Parameters of Turbo Pump

Bearing	Magnetically Levitated
Compression ratio for Ar	$> 1 \cdot 10^{11}$
Compression ratio for H_2	$5 \cdot 10^{5}$
Compression ratio for He	$> 1 \cdot 10^{8}$
Compression ratio for N_2	$> 1 \cdot 10^{11}$
Cooling method, standard	Water
Flange (in)	DN 100 CF-F
Flange (out)	DN 16 ISO-KF
Fore-vacuum max. for N_2	20 hPa
Pumping speed for Ar	250 l/s
Pumping speed for H_2	170 l/s
Pumping speed for He	215 l/s
Pumping speed for N_2	255 l/s

Gas Type Dependent Compression Ratio



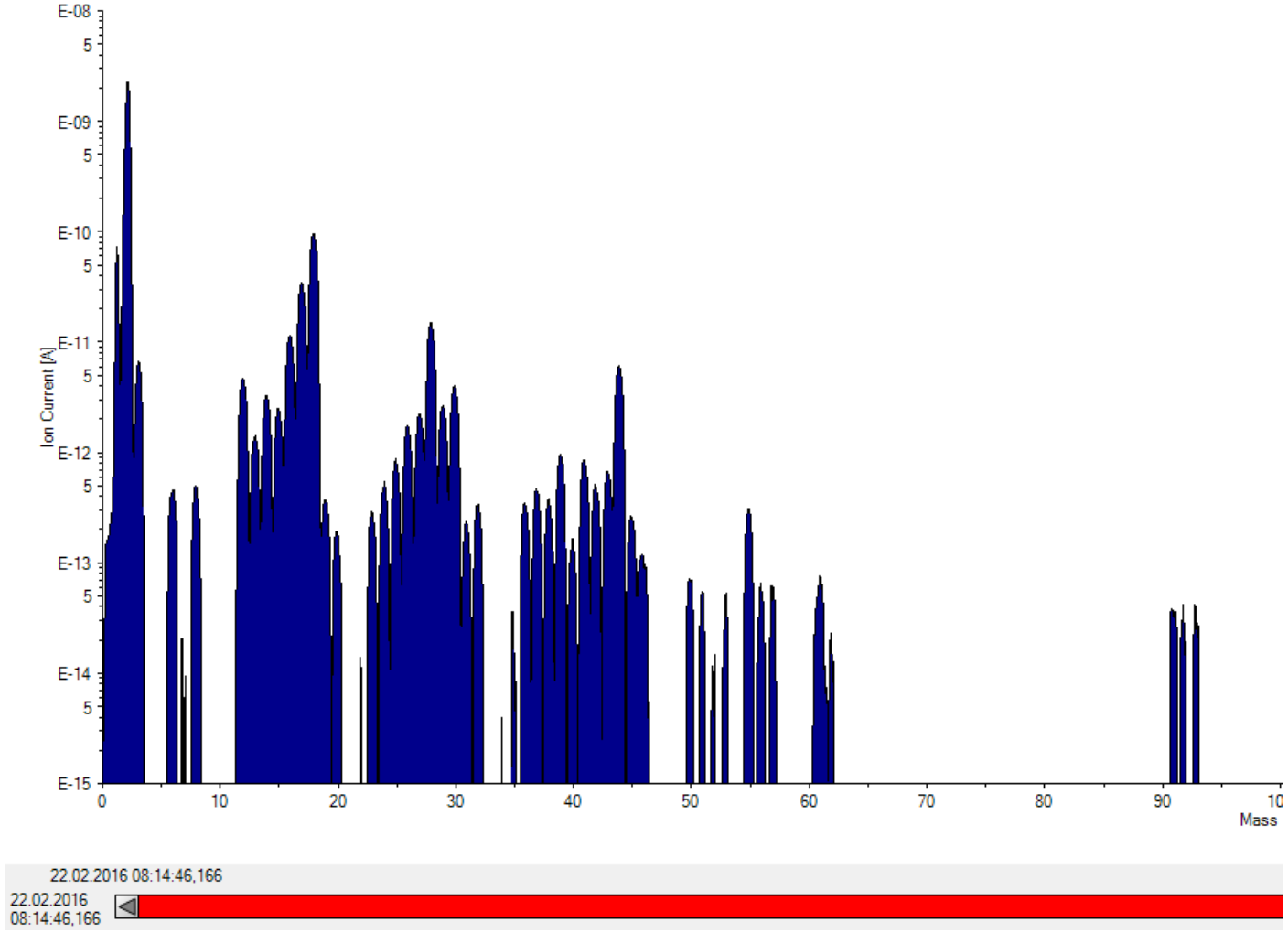
Experimental Set Up



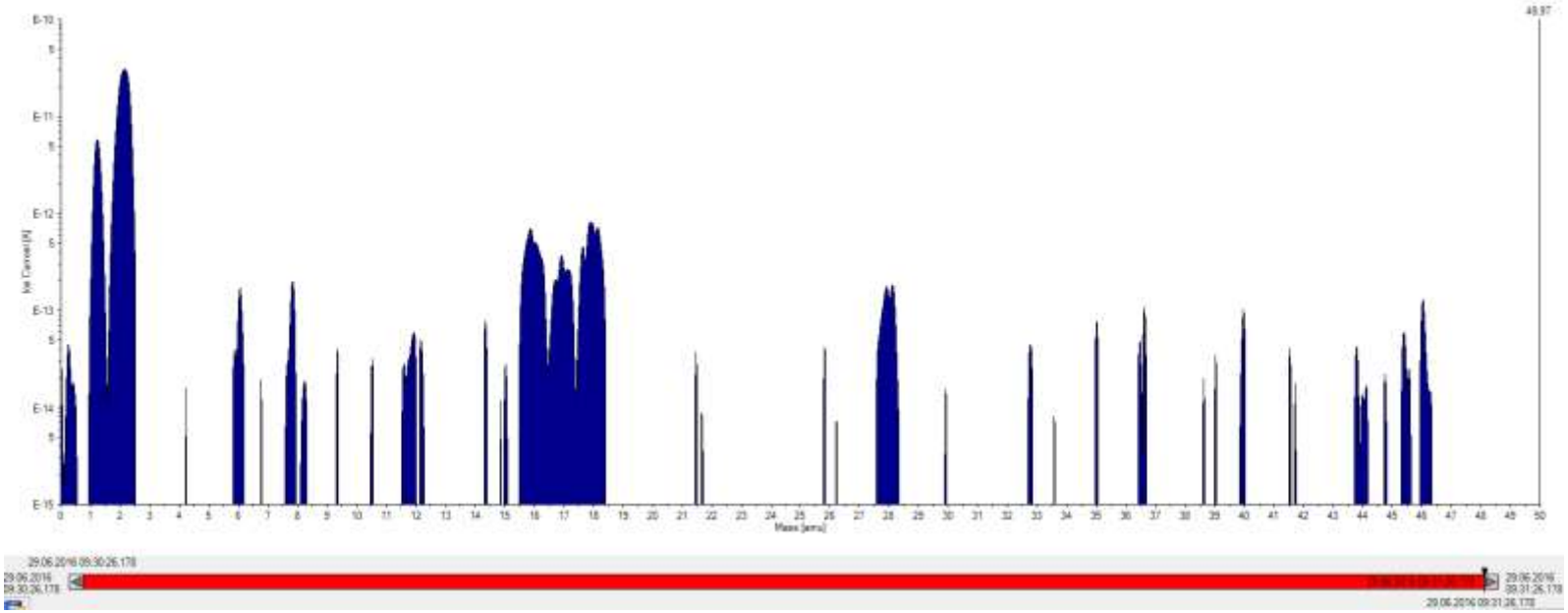
Devices used in Experiment

- Turbo Pump: HiPace 300 M
- Backing Pump: Multi stage roots pump ACP 28
- Total Pressure gauge: Bayard-Alpert Hot Cathode Gauge
- Residual Gas Analyzer: Quadrupole Mass Spectrometer PrismaPlus QMG 220
- Volume of Chamber: V = 9 l
- Baking: 48 h at T = 140 ° C

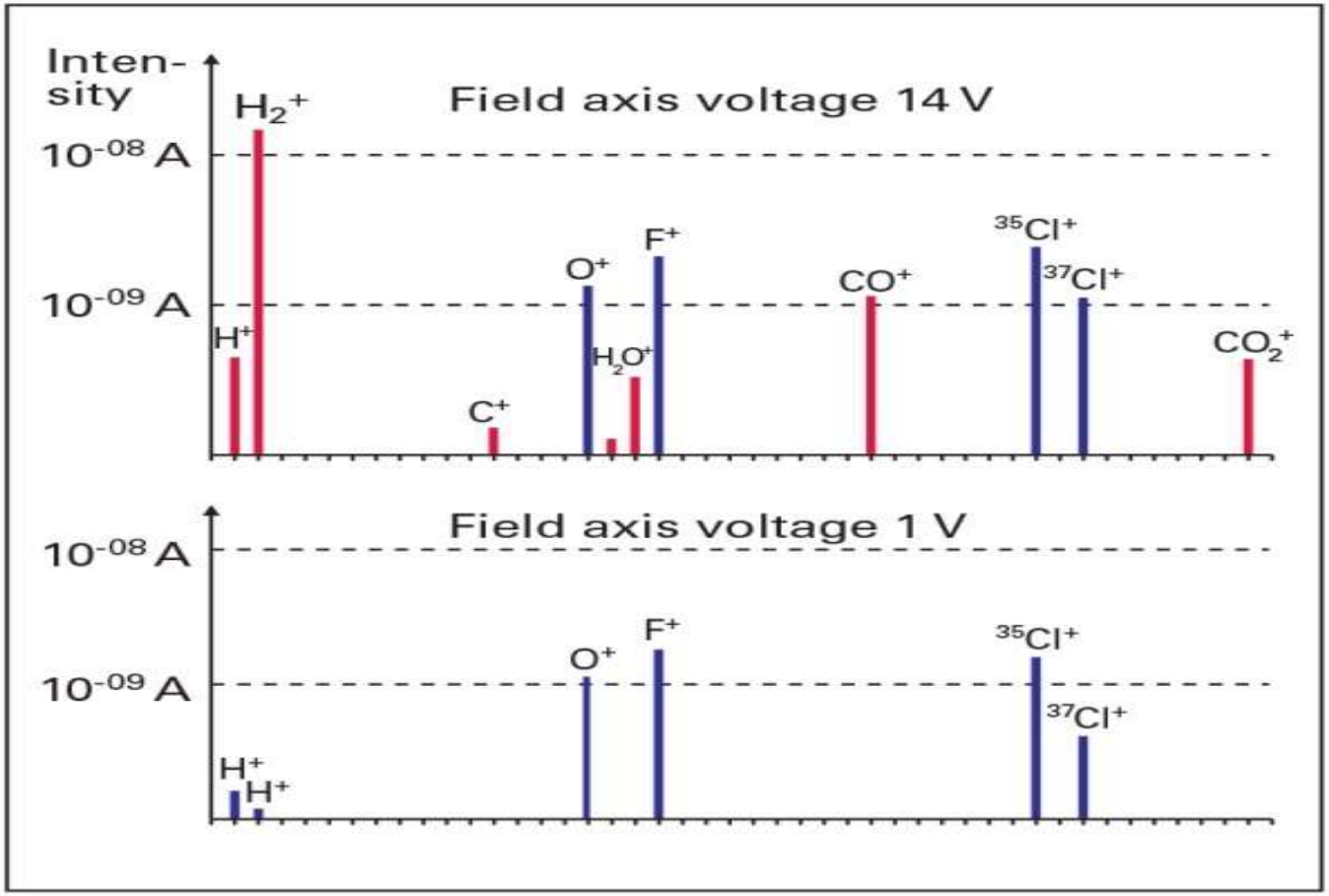
Residual Gas Analysis before Baking



Residual Gas Analysis after Baking



Influence of ESD Ions



Summary

- Reduction of Hydrogen concentration by 2 orders of magnitude
  - High compression ratio for Hydrogen
- No Hydrocarbons:
  - Dry backing pump
  - Magnetically levitated Turbo pump with high compression ratio
- Influence of ESD ions