Diesel Aerosol Monitoring with a high speed Laser Spectrometer

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GRIMM Laser Spectrometer

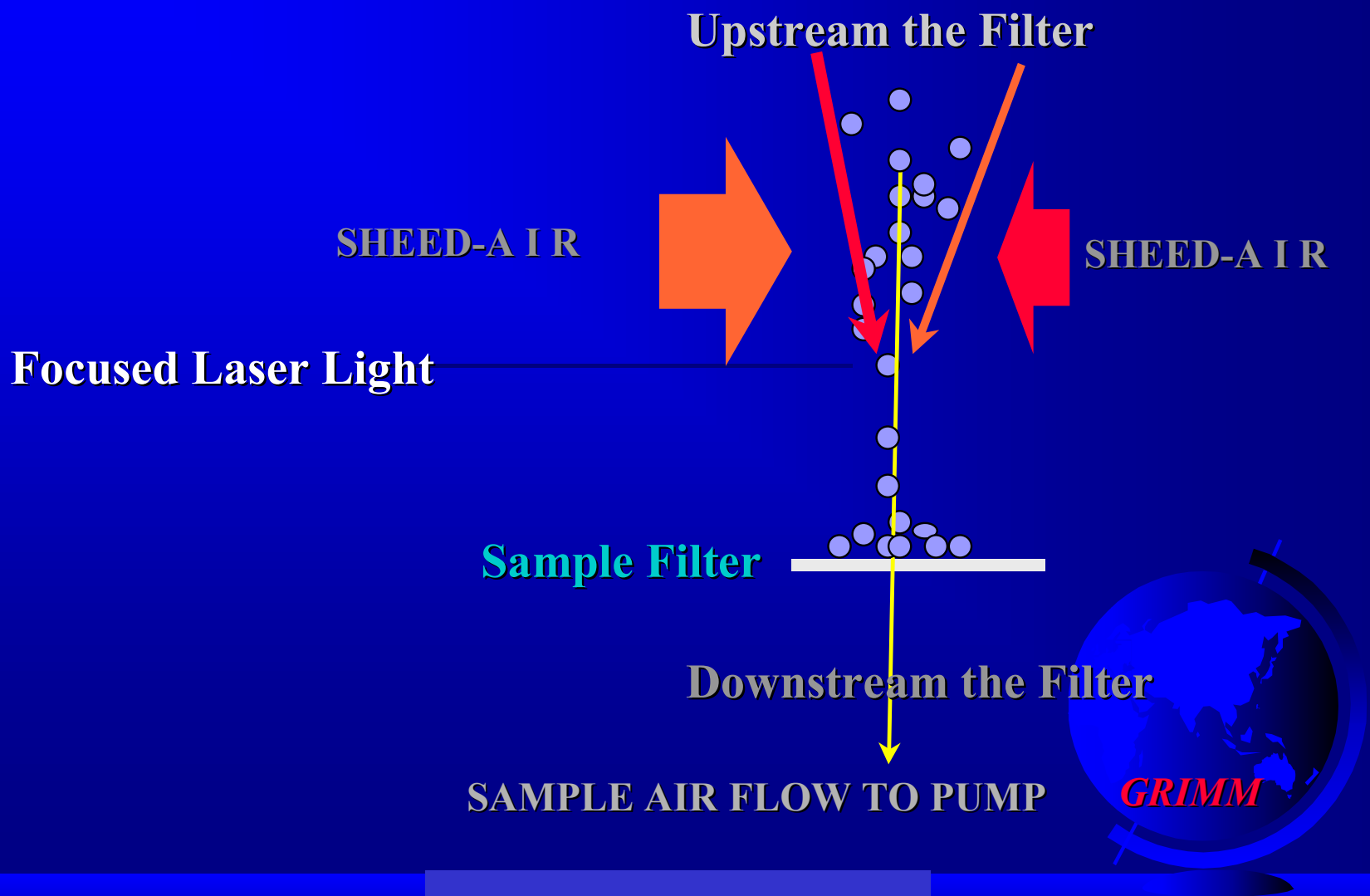
1. Instrument Concept
2. Measurement Arrangement
3. Results
4. Instrument Conclusions

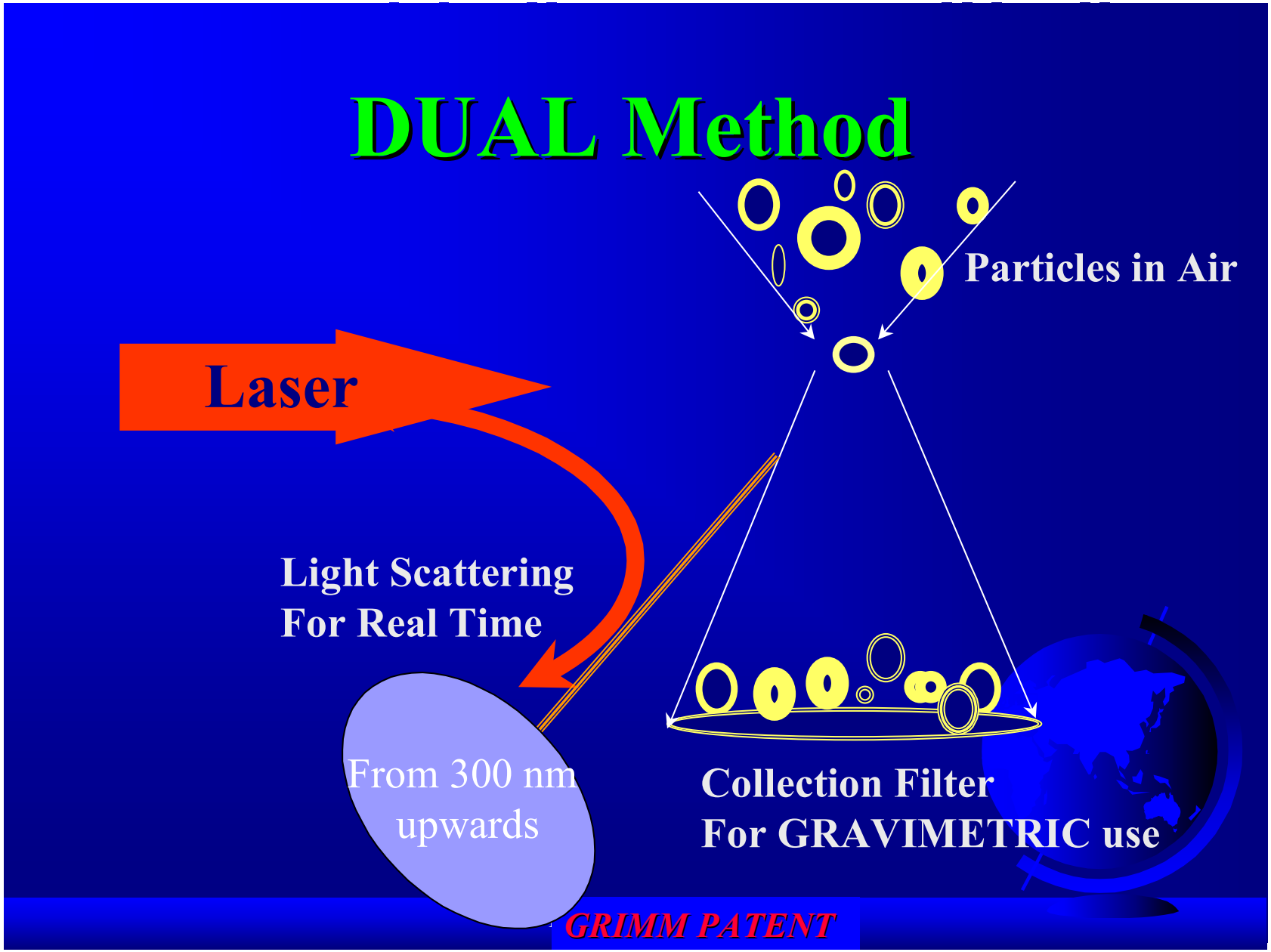
Optical Particle Counter Concept

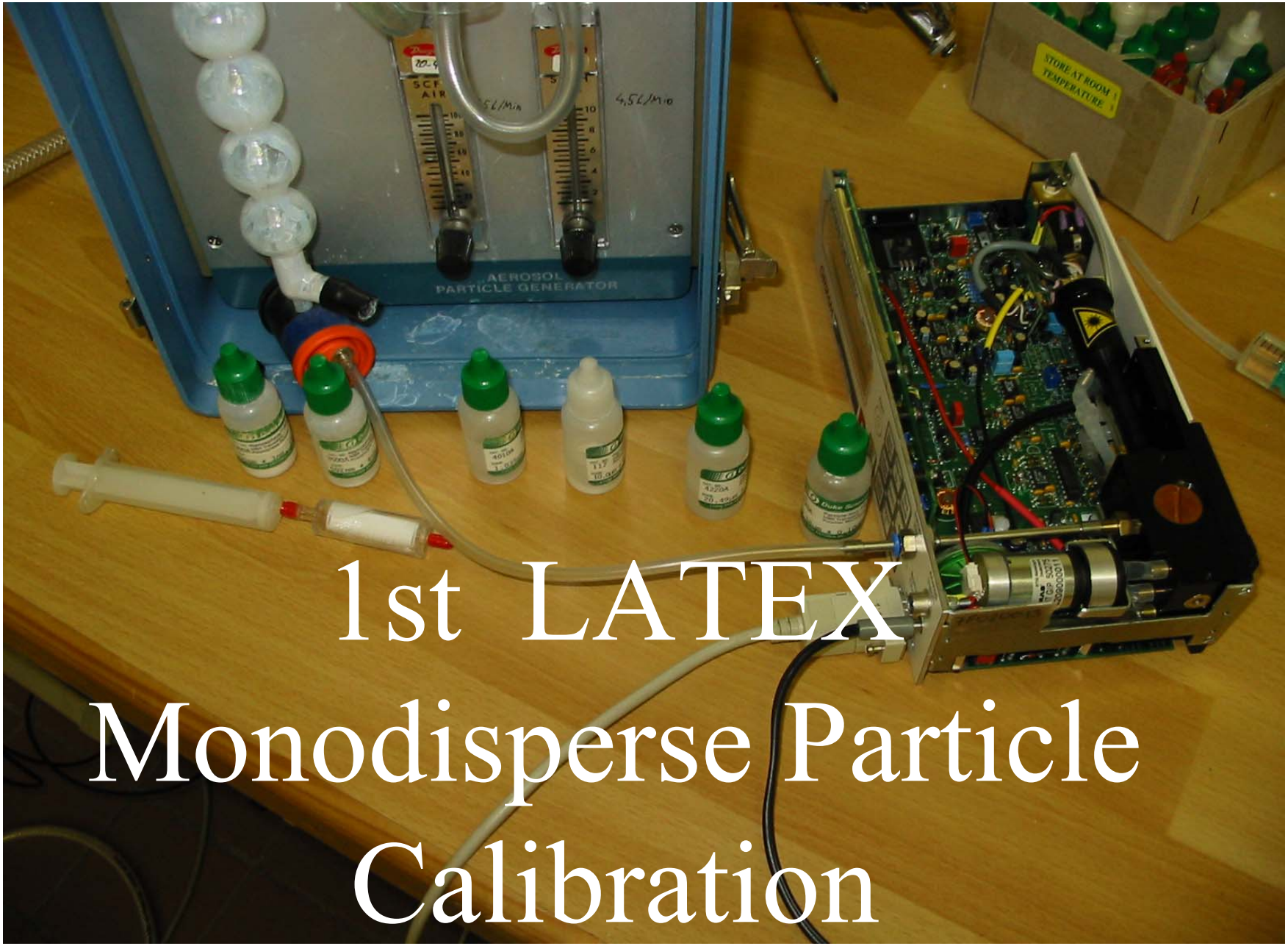
ADVANTAGES:

- Count Concentrations 10^4 /cm^3
- Min.refractive index influences
- High sheath air cleaning
- Automatic ZERO test
- Sample collection on filter
- Instant results
- Portable and light weight
- <u>Optional:</u>
  - Dehumidification system
  - Dilution System
  - Remote (MODEM)control
  - Extra sensor attachment
  - Software package

Optical Detection System




DUAL Method
Particles in Air
Laser
Light Scattering
For Real Time
From 300 nm
upwards
Collection Filter
For GRAVIMETRIC use
GRIMM PATENT



1st LATEX Monodisperse Particle Calibration

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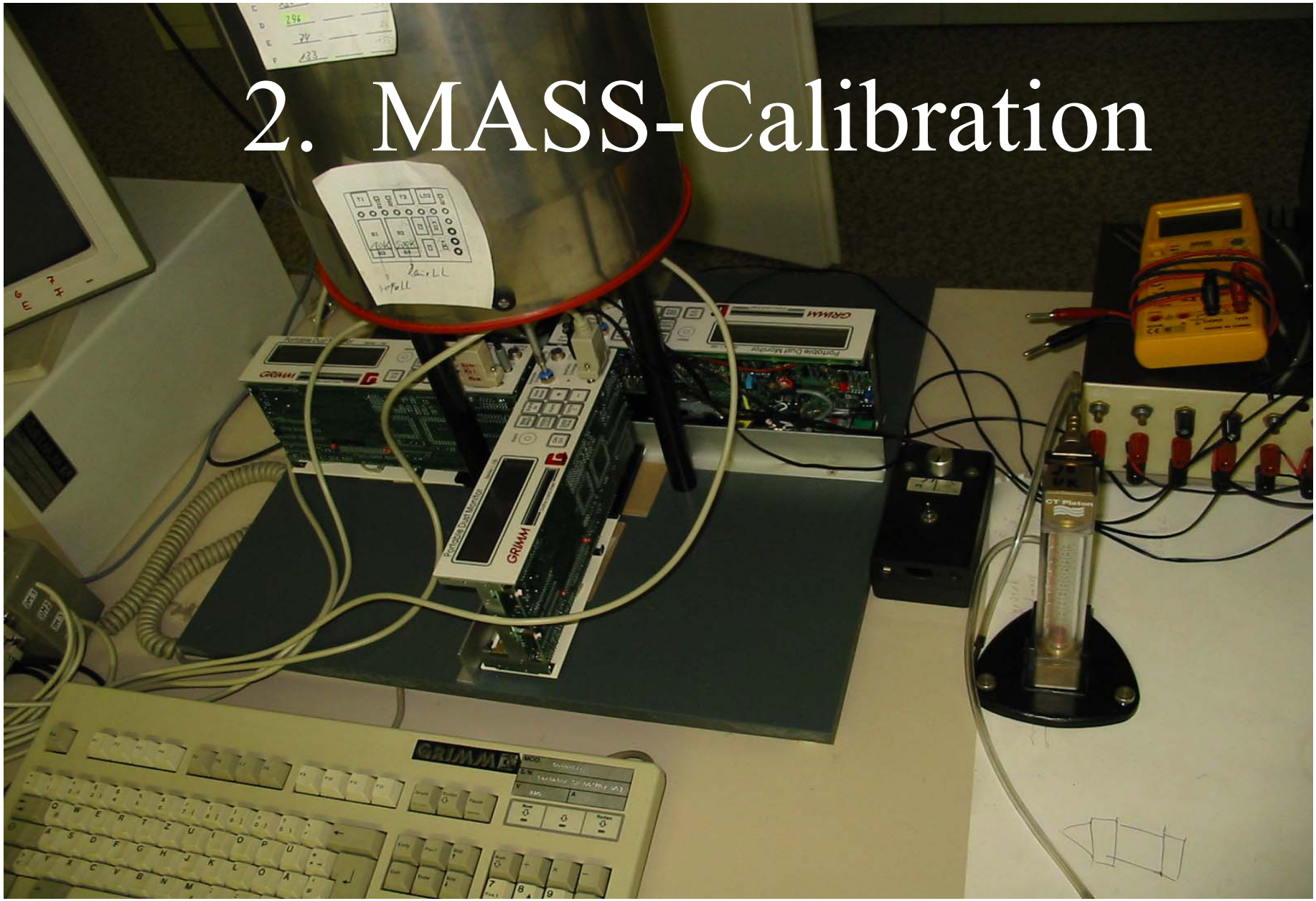
2. MASS-Calibration



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INSTRUMENT VERIFICATION

Present 1.109
Size Range
from 0.25
0.30
0.35
0.40
0.45
0.50
0.60
0.70
0.80
1.00
1.60
and 2 micron

CONTROL PARAMETERS FOR EACH UNIT:

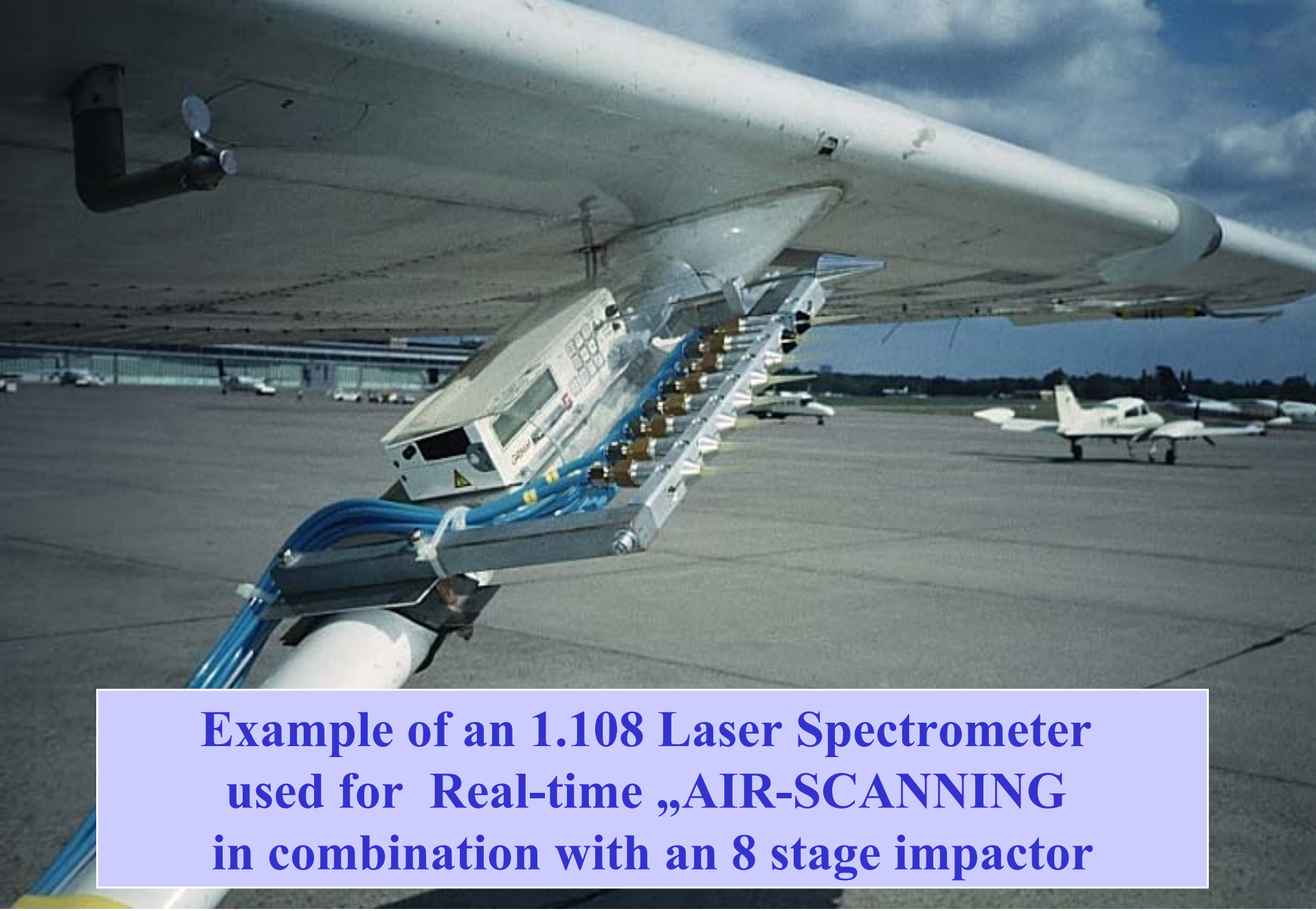
* Calibration of all 12 or16 size channels
- Flow control system setting for 72l/h
- Count control to 10^7 Particles/dm^3
- And Mass control to 10 mg/m^3
- 1 sec Size distribution control
- 1 sec Data refreshed control
- Data protocol in counts and mass
- Data storage on data logger card
- Communication control via RS-232
- Port control for Temp.- +rel.Humidity
- Build-in dust collecting filter
- Build-in battery charger control
- Battery and VAC control at 110 / 220
- Driver and GRIMM software control
- Physical inspection.

Instrument Concept

2.Measurement Arrangement

Obtained Results

Instrument Conclusions



Example of an 1.108 Laser Spectrometer used for Real-time „AIR-SCANNING in combination with an 8 stage impactor

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Example of a 1.108 Laser spectrometer in combination with a portable Diluter

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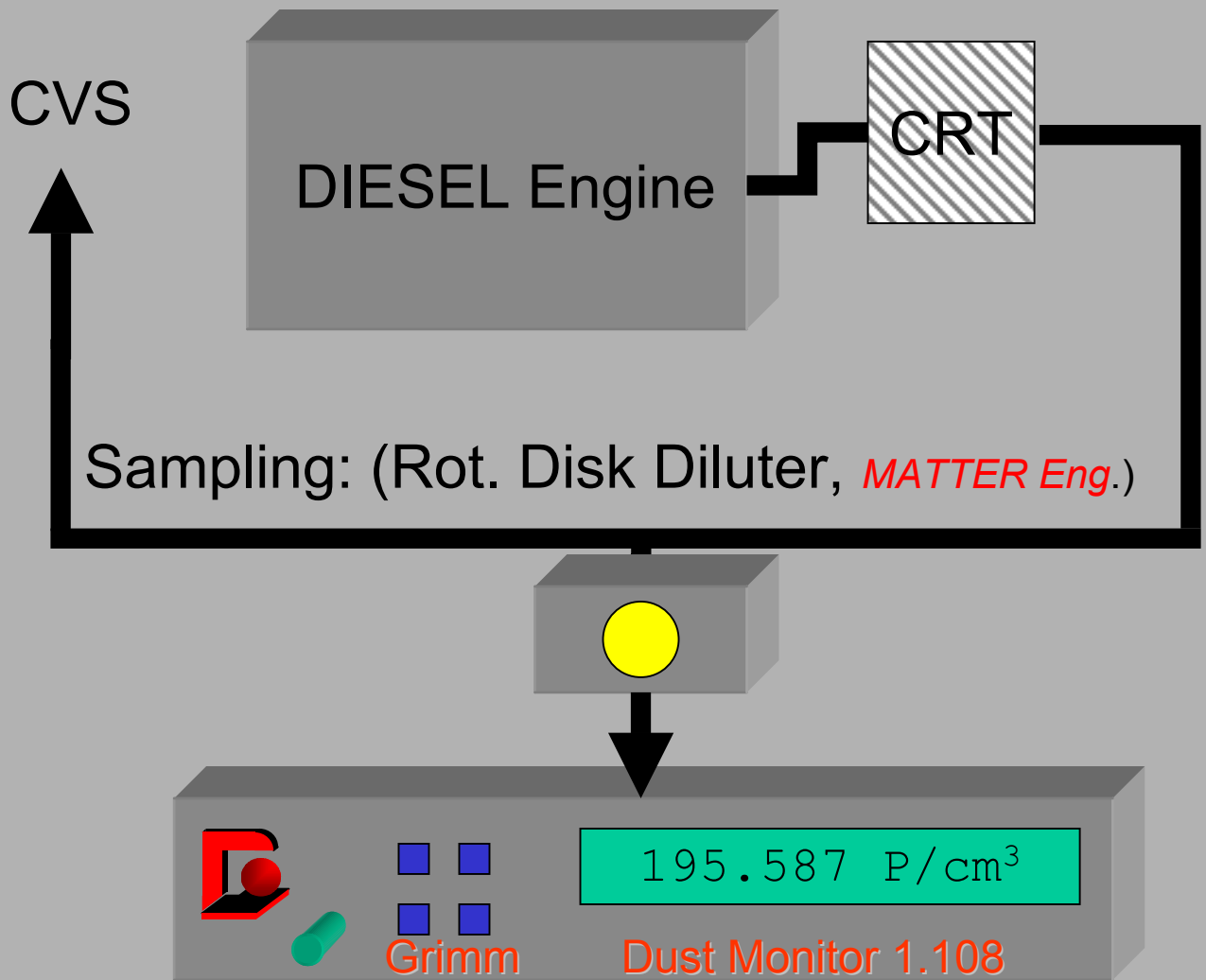
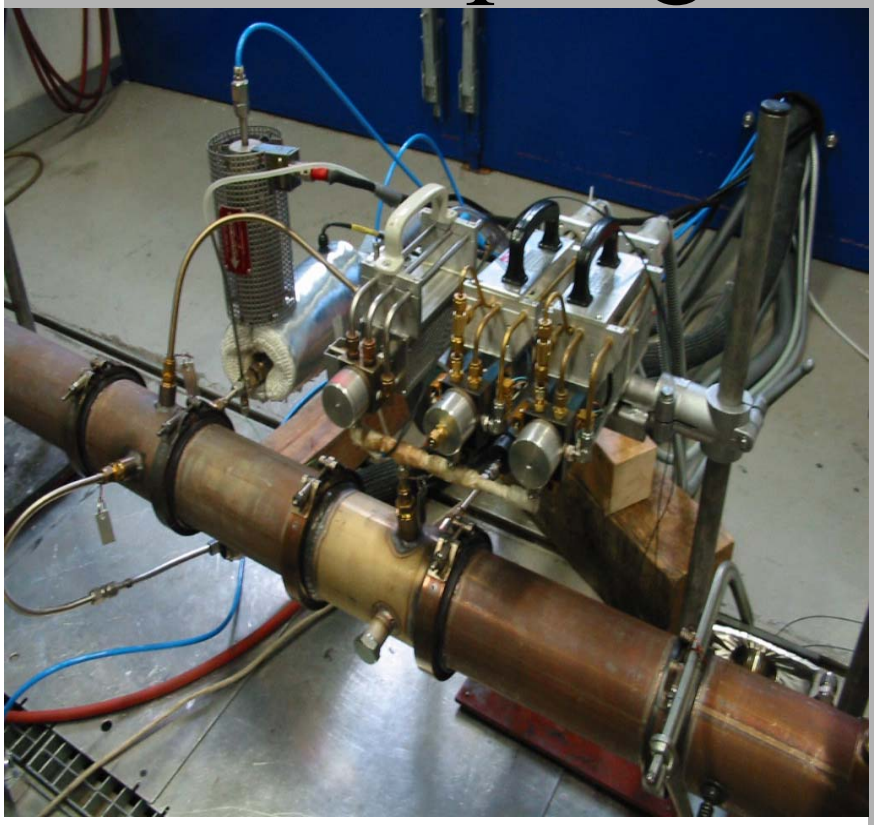
Stationary Test System Configuration



Sampling Arrangement:



A rotating disk diluter (Matter Inc.) is used for instant Measurement assuring proper sample feeding at variable MOTOR conditions.

Instrument Concept

Measurement Arrangement

3. Obtained Results

Instrument Conclusions

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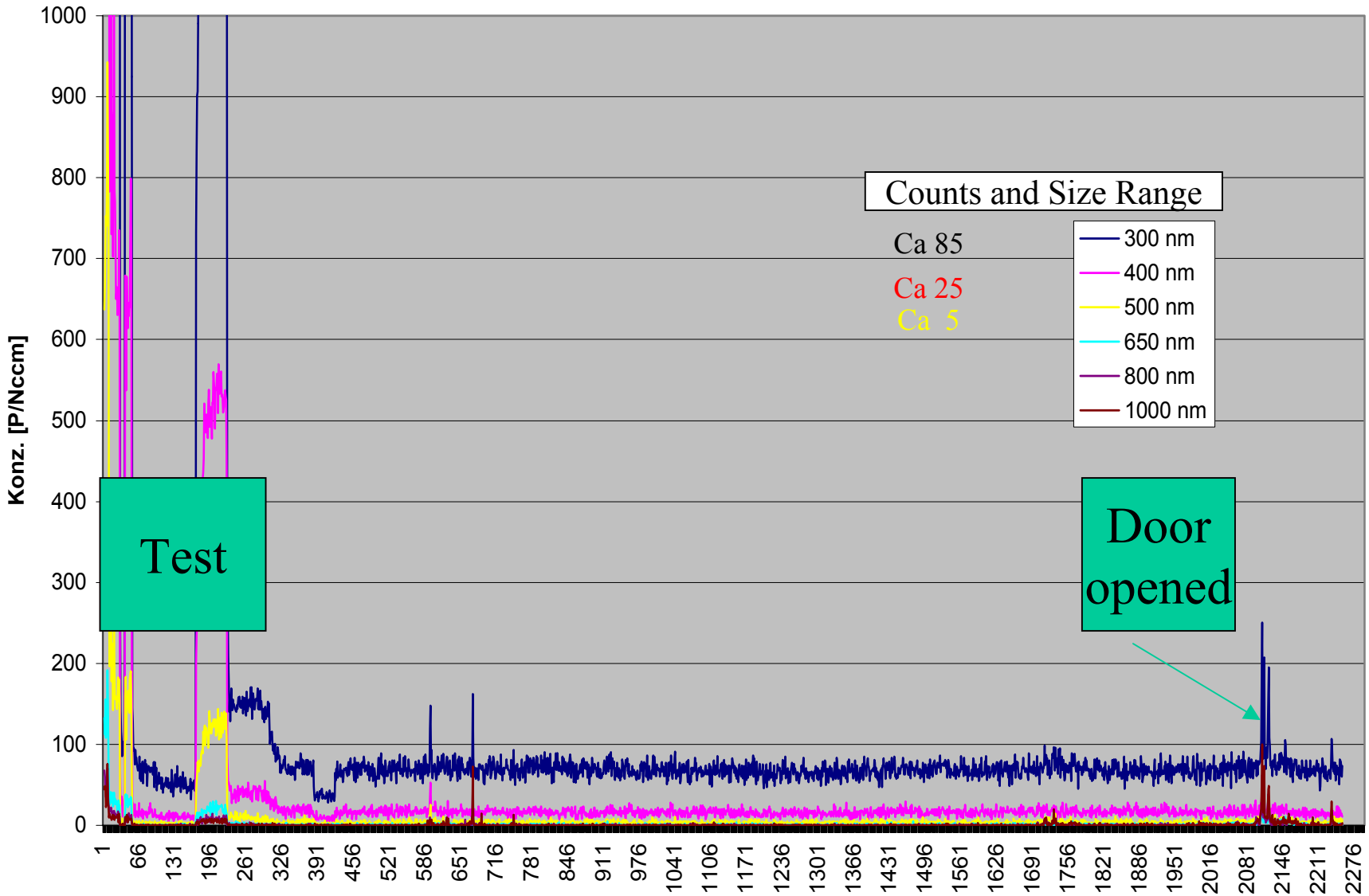
Background Measurement *(Data in Seconds)*



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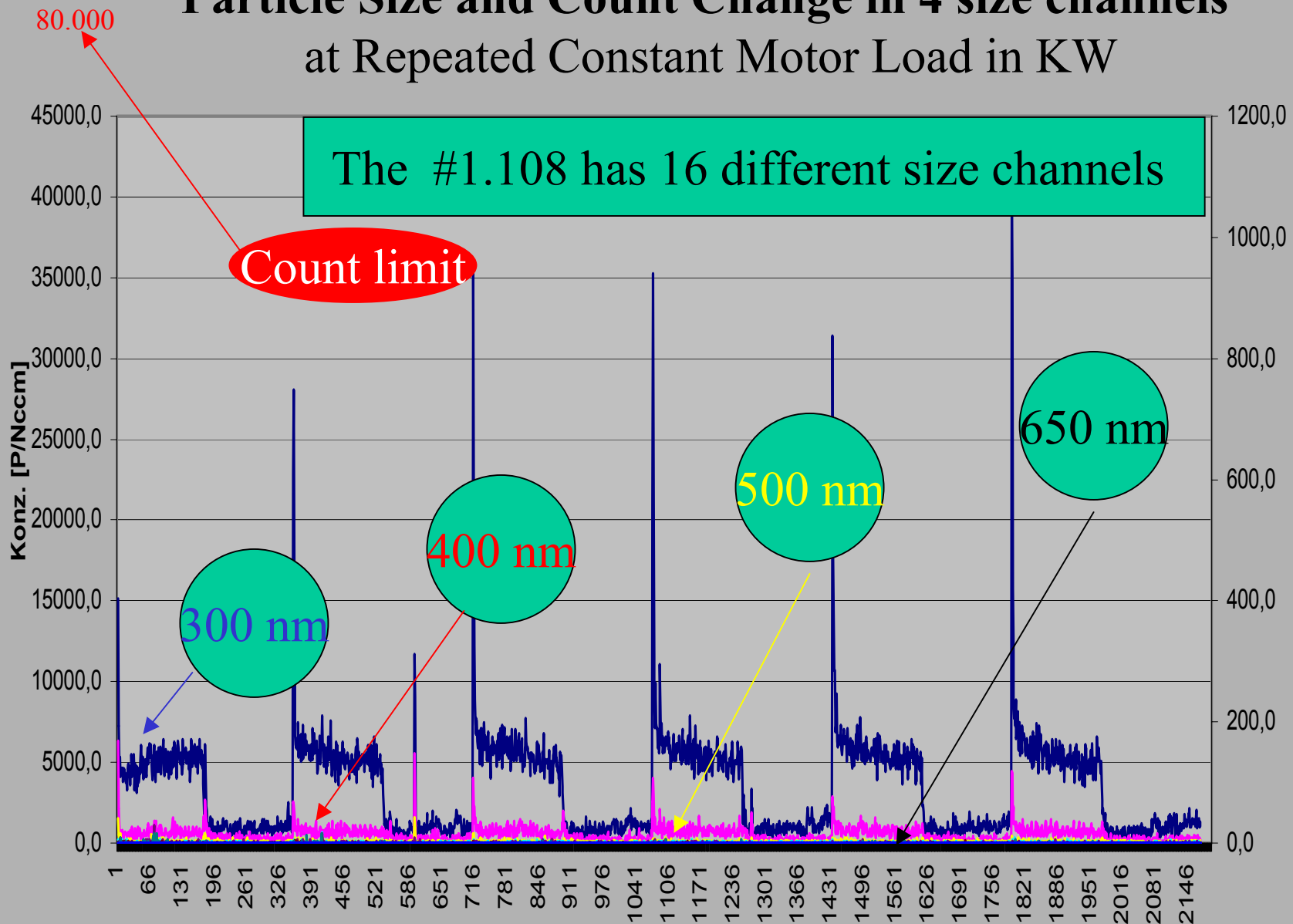
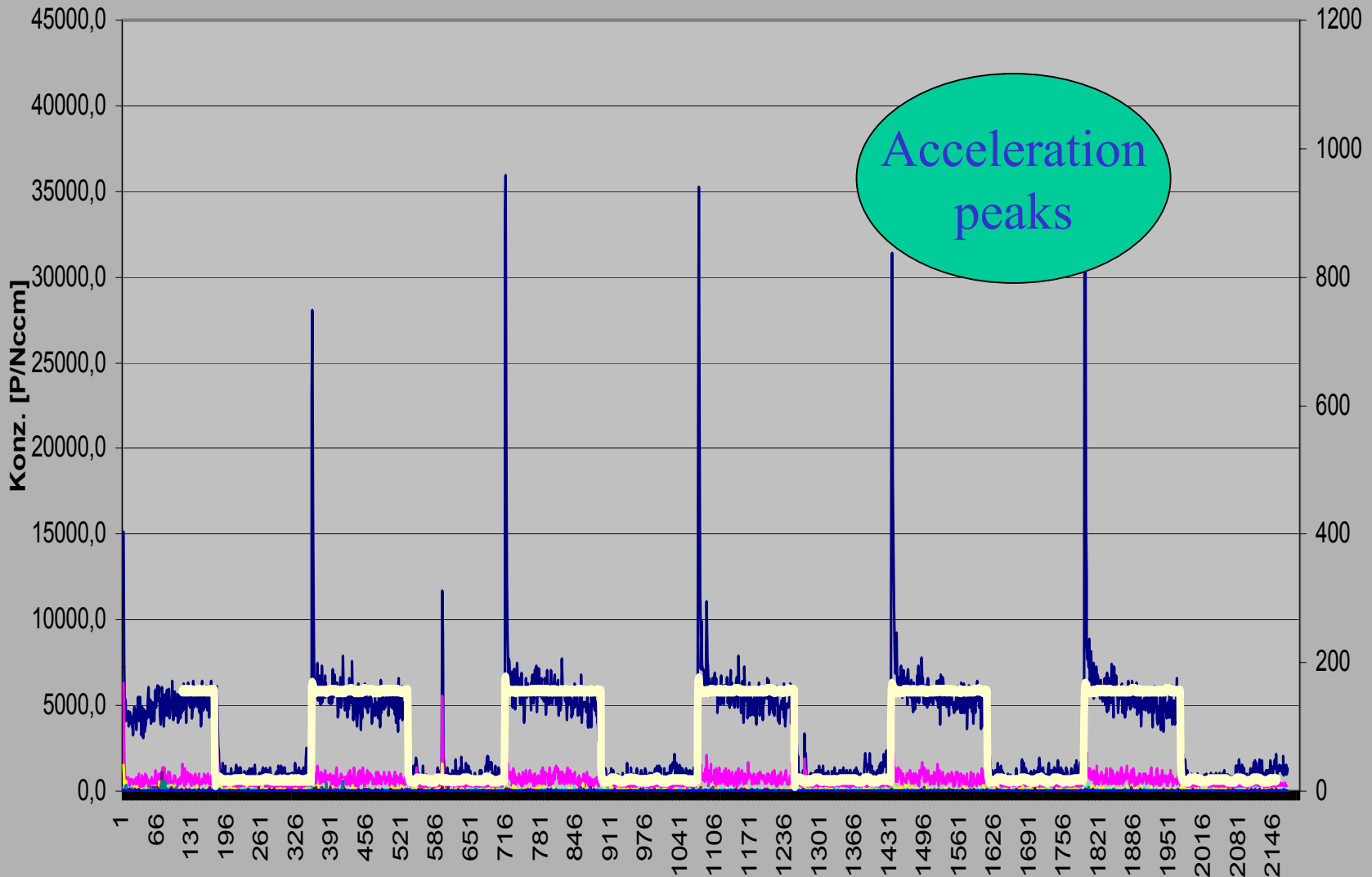
Particle Size and Count Change in 4 size channels

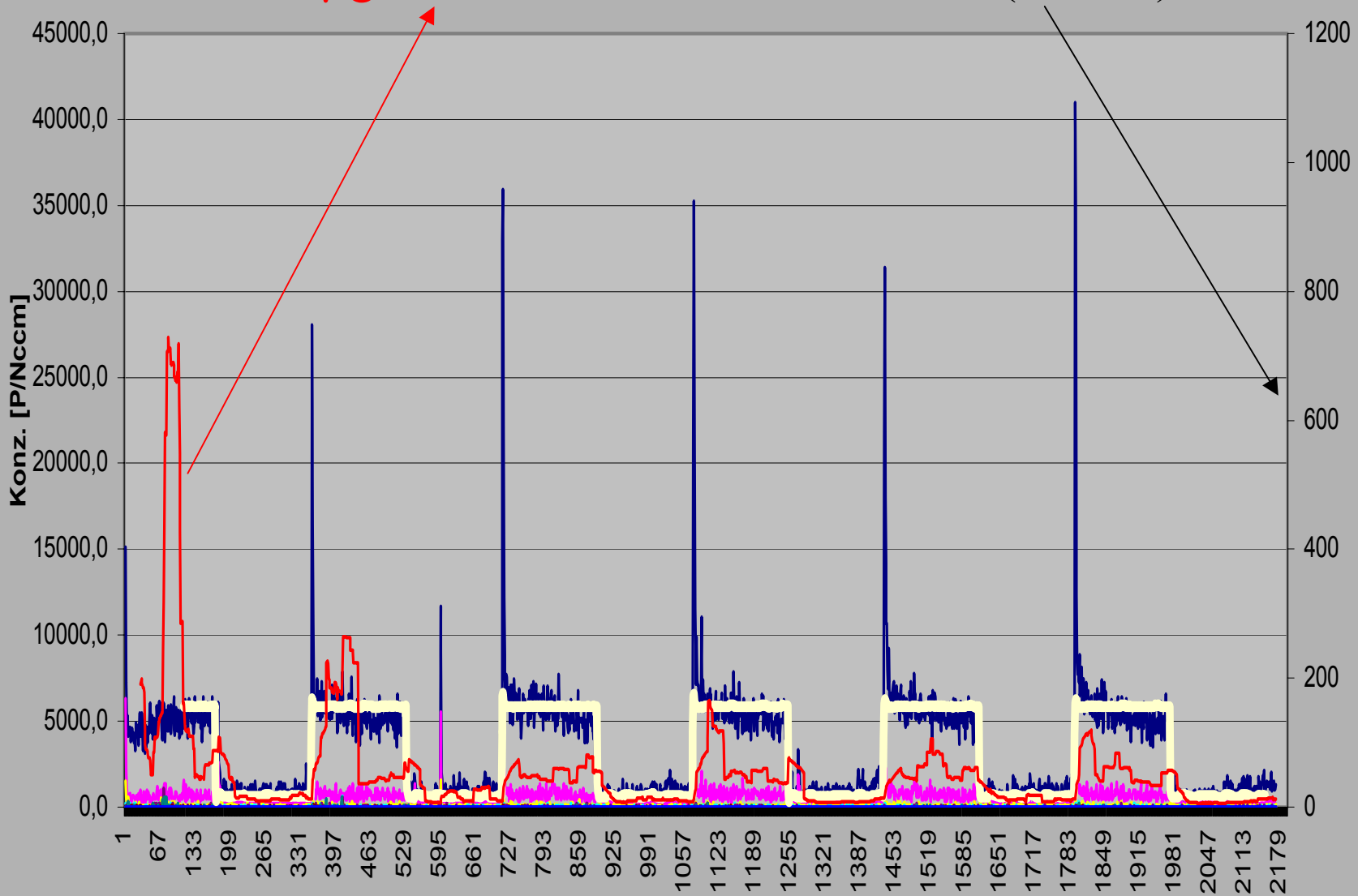
at Repeated Constant Motor Load in KW



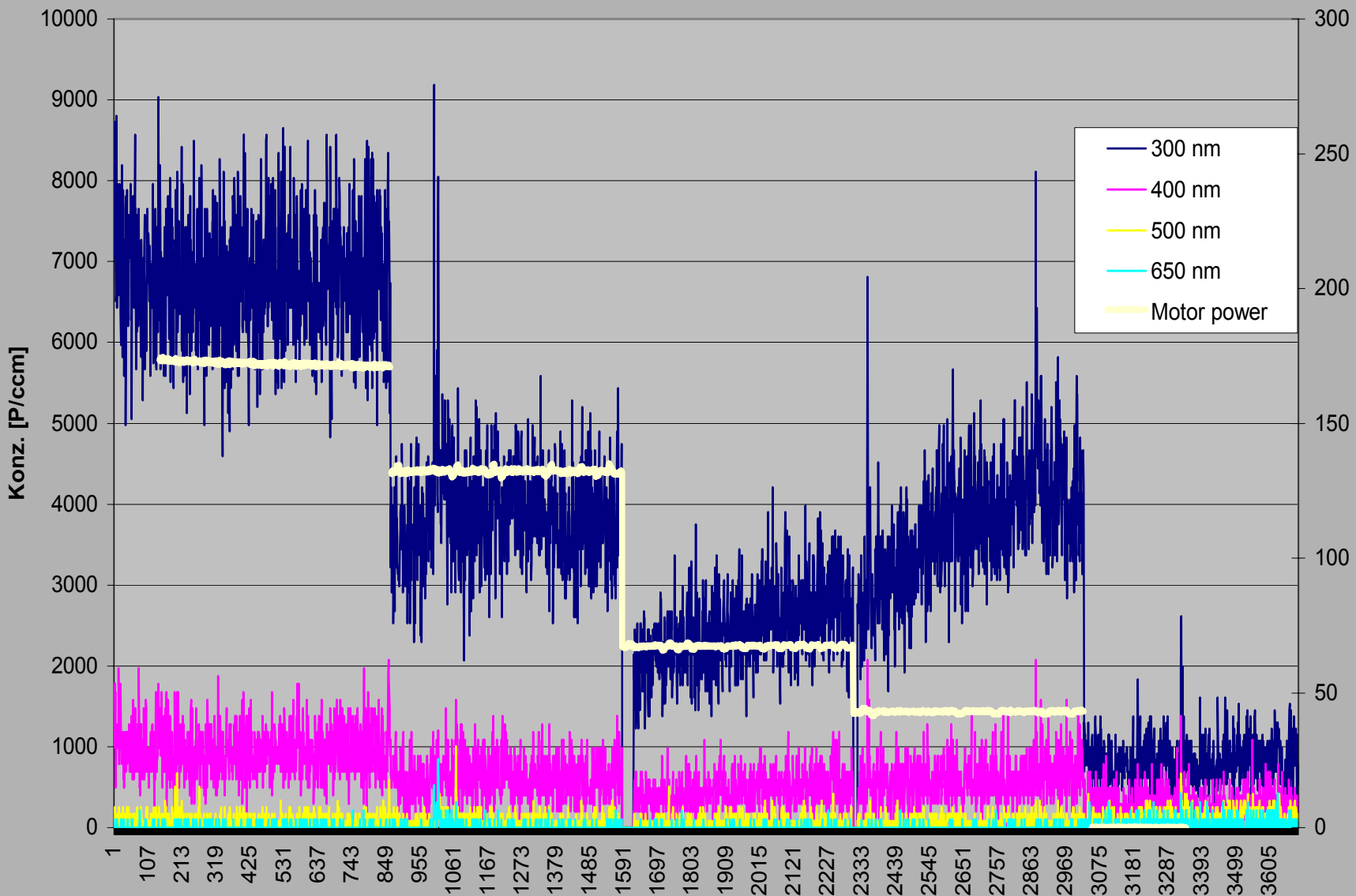
Particle Counts and Motor Load Curve (in KW)



Dust Mass, Particle Size and **Motor Load**



Particle Counts and Motor Load at different conditions (in KW)



Instrument Concept

Measurement Arrangement

Obtained Results

4. Instrument Conclusions

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Conclusion:

DIESEL Particles
can be mesured
in real time

at any specific sampling point with the rotating disk diluter (*Matter*) and the attached

* „white“ model (1.108)
  (= 15 channels from 03. to 20 µm)

* or the „silber“ model 1.109
  (= 12 channels from 0.2 to 2µm)

INSTRUMENTATION OUTLOOK

Possible integration of a

- Dilution system
- Sample conditioner
- 19“ rack solution

Instrument improofment for

- Sensitivity below 100 nm
- Selve test intellegence

Application software

GRIMM AEROSOL TECHNIK

An interesting way

for futhure optical

Instrument Applications...

THANK YOU FOR YOUR ATTENTION

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