

From benchtop to process NIR control



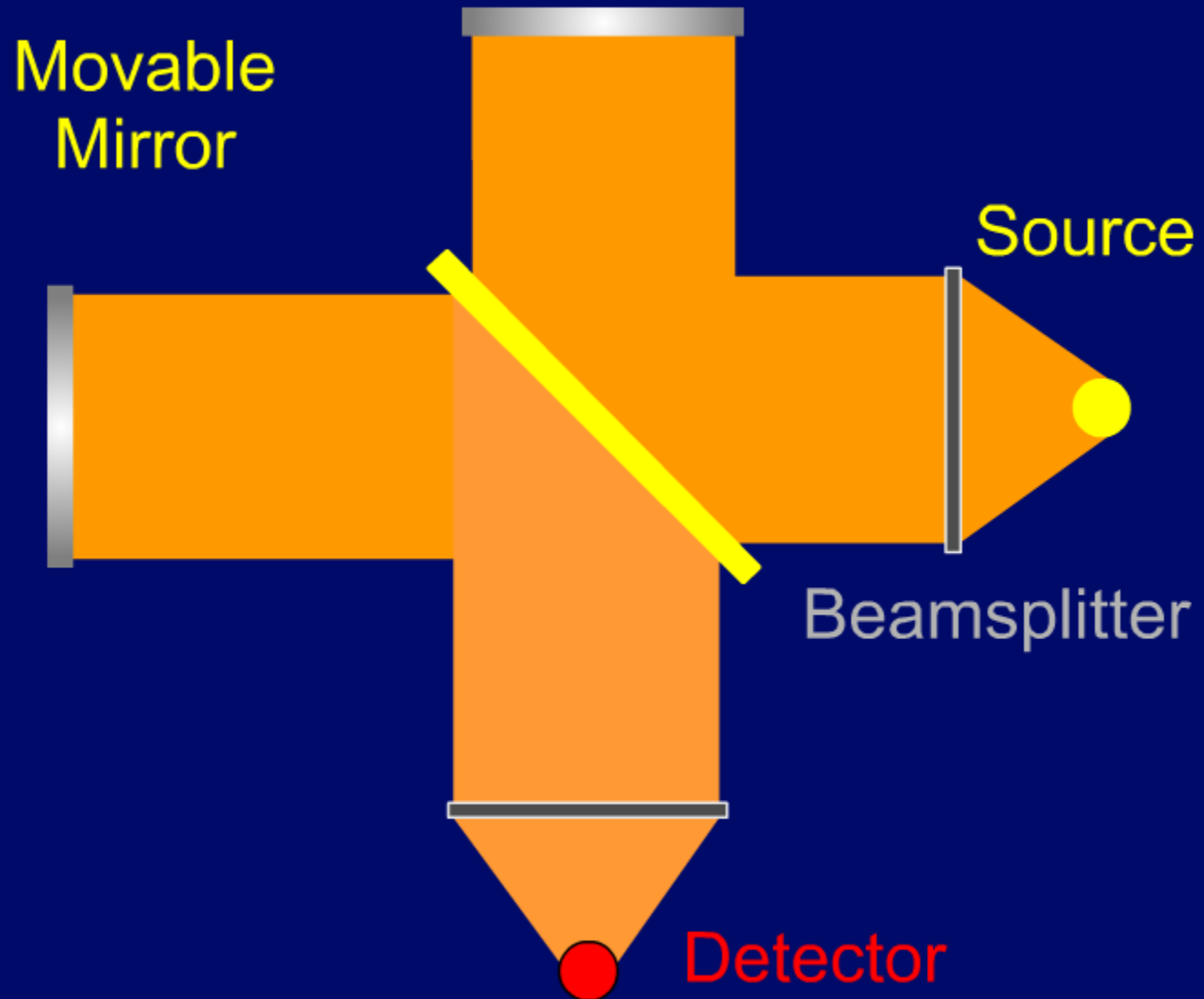
André Kok Int. Key Account Manager Food, feed & Agri

Andre.kok@brukeroptics.de

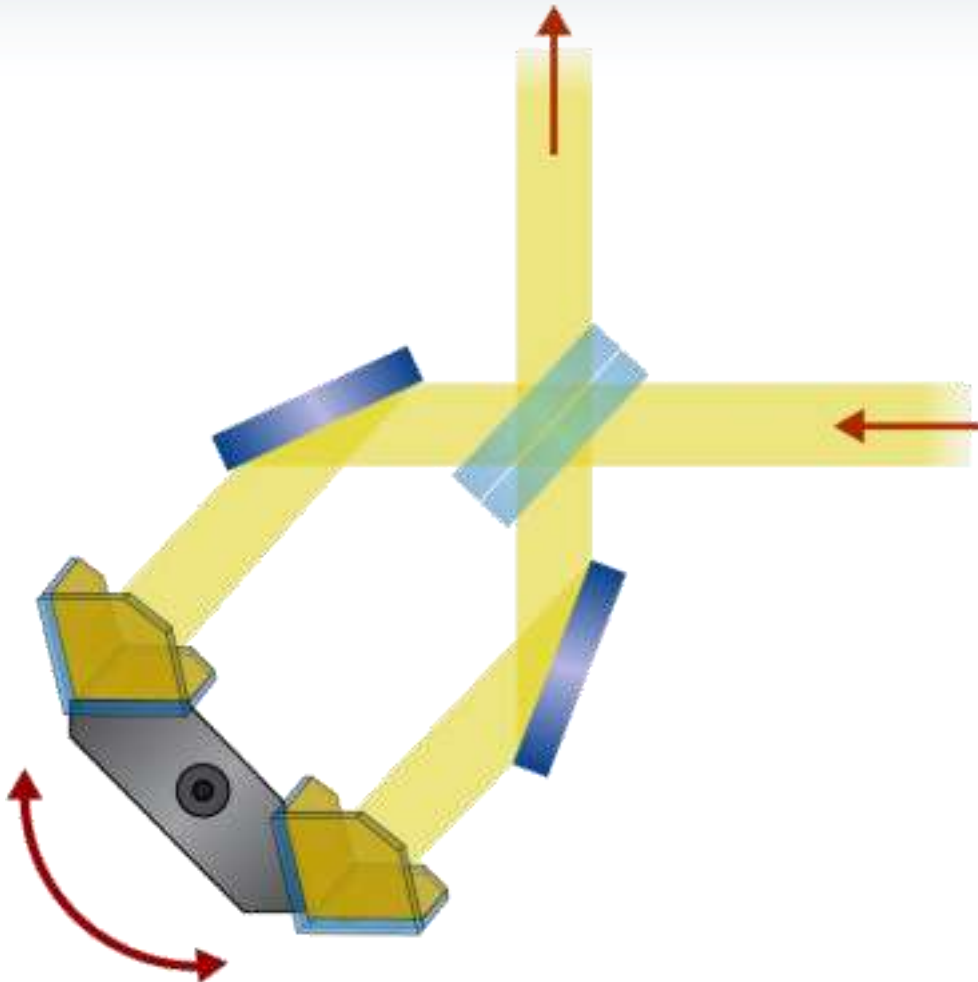
CRA-W Gembloux 27 March 2013



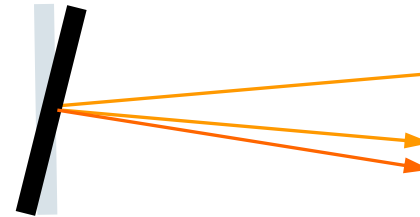
Michelson Interferometer



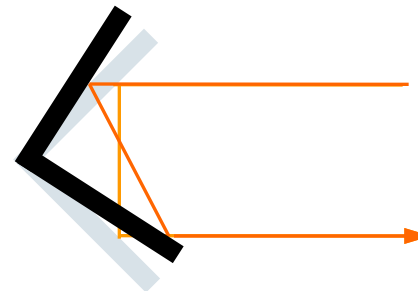
Cube-Corner Interferometer



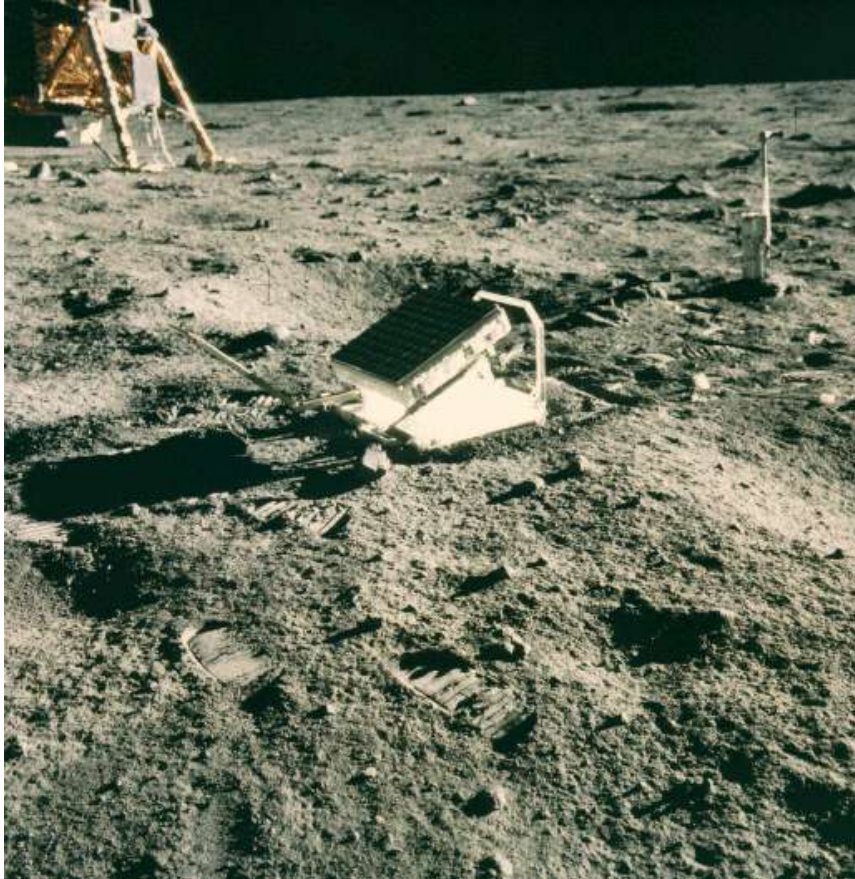
- ❑ **Plane Mirrors in a classical Michelson Interferometer**



- ❑ **Cube-Corner Mirrors in a ROCKSOLID-Interferometer**



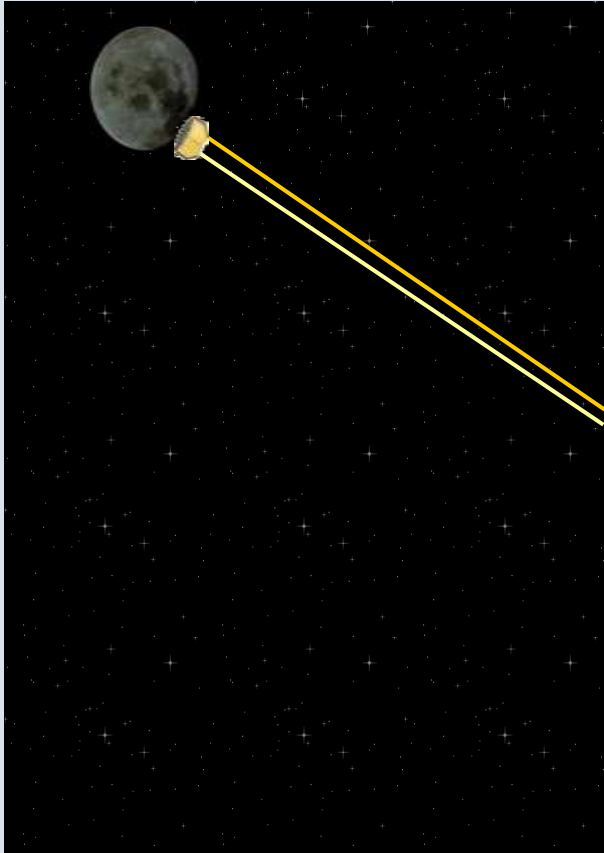
Apollo 11 only still running experiment



- Buzz Aldrin and Neil Armstrong put an array of cube corner mirrors on the moon on July 21, 1969
- Size 60x60 cm
- 100 mirrors

Source: Nasa Science

Cube-Corner mirror on the moon



Laser Pulse: Earth-Moon-Earth in 2,6 s

→ Distance Earth-Moon:

384.000 km

Flat mirror with deviation of 0.1° degree:

→ Laser beam misses target on earth

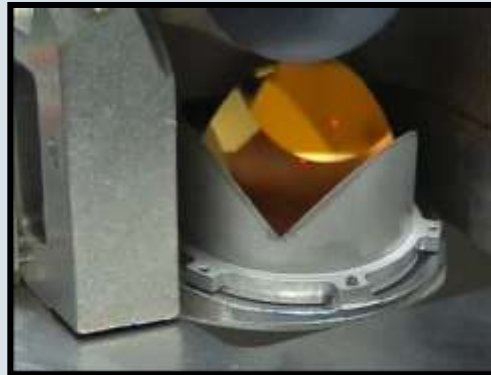
more than 600 km

Example of a Bruker interferometer

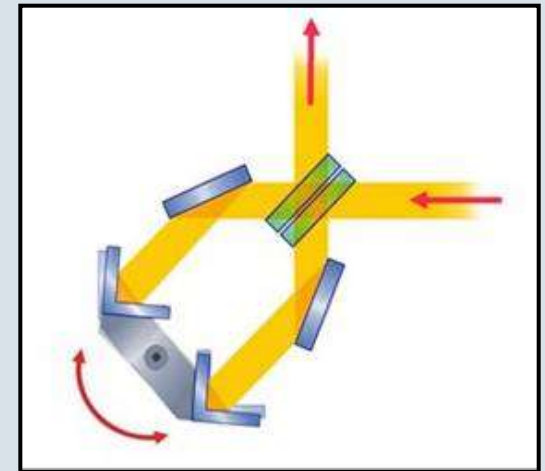


- RockSolid™ Interferometer

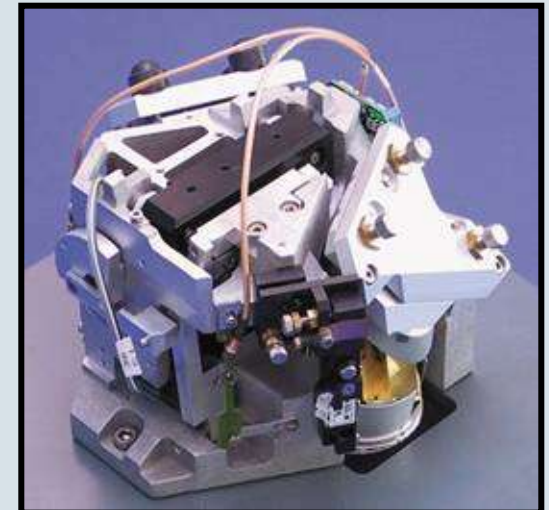
- CubeCorner mirrors:
permanently aligned
Angle accuracy:
better than $0,001^\circ$
(=1cm on 1km)



- Wearless bearings based on
steel springs,
like a clockwork



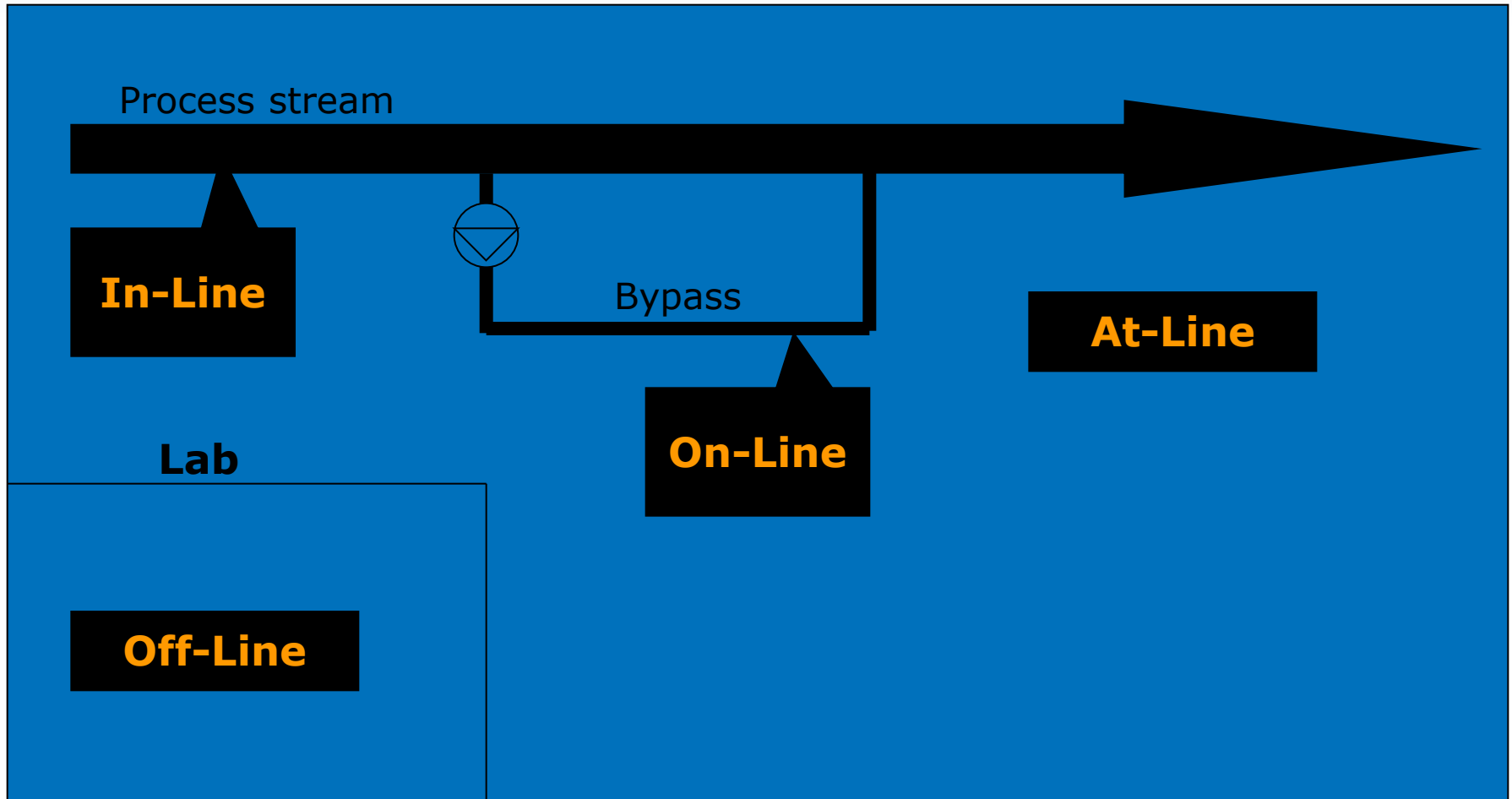
US Patent No 5.309.217



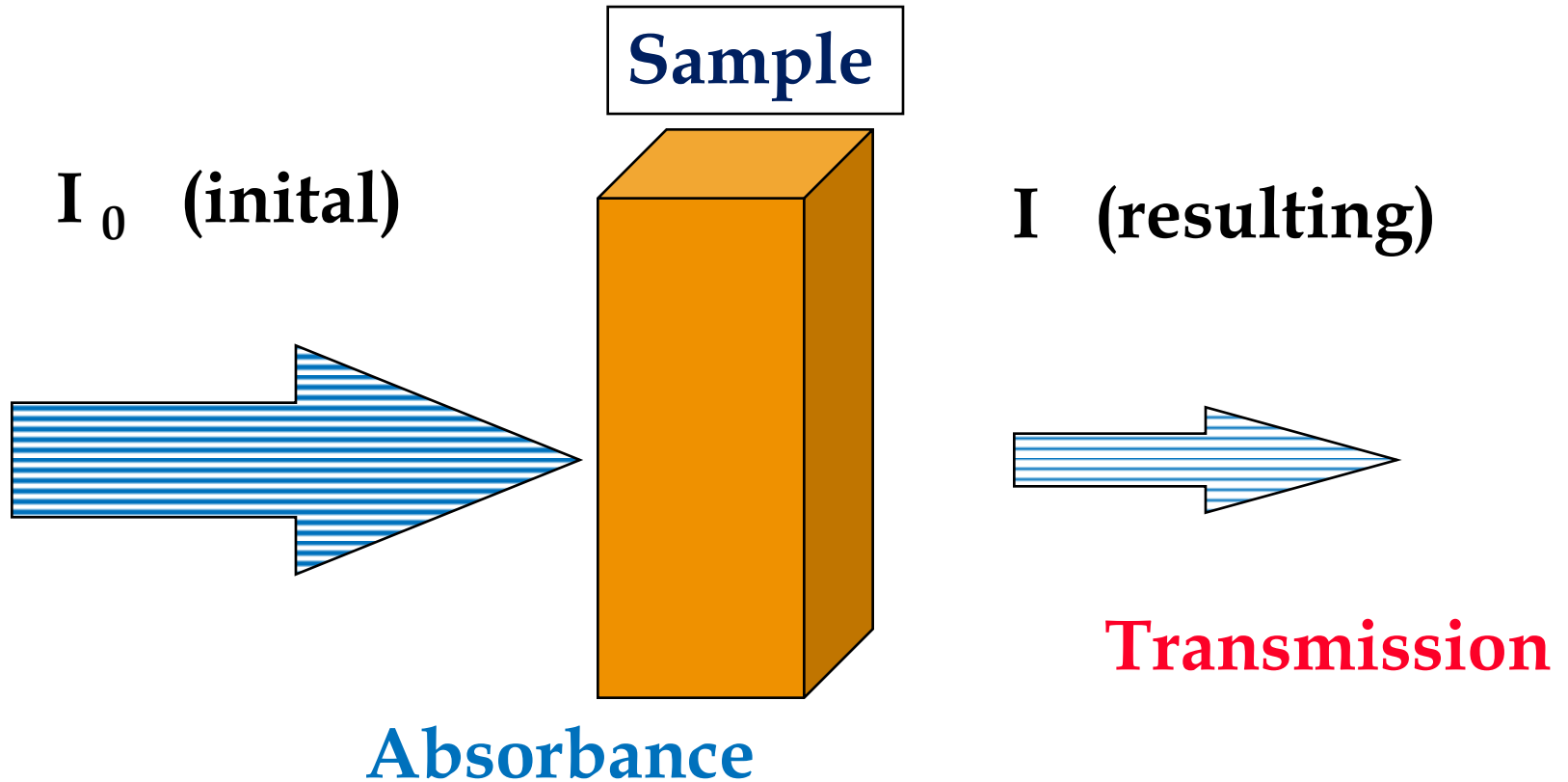
Definitions of process NIR



Factory



Measuring Mode: Transmission



Off-line/At-line (Transmission)



Sample
Compartment

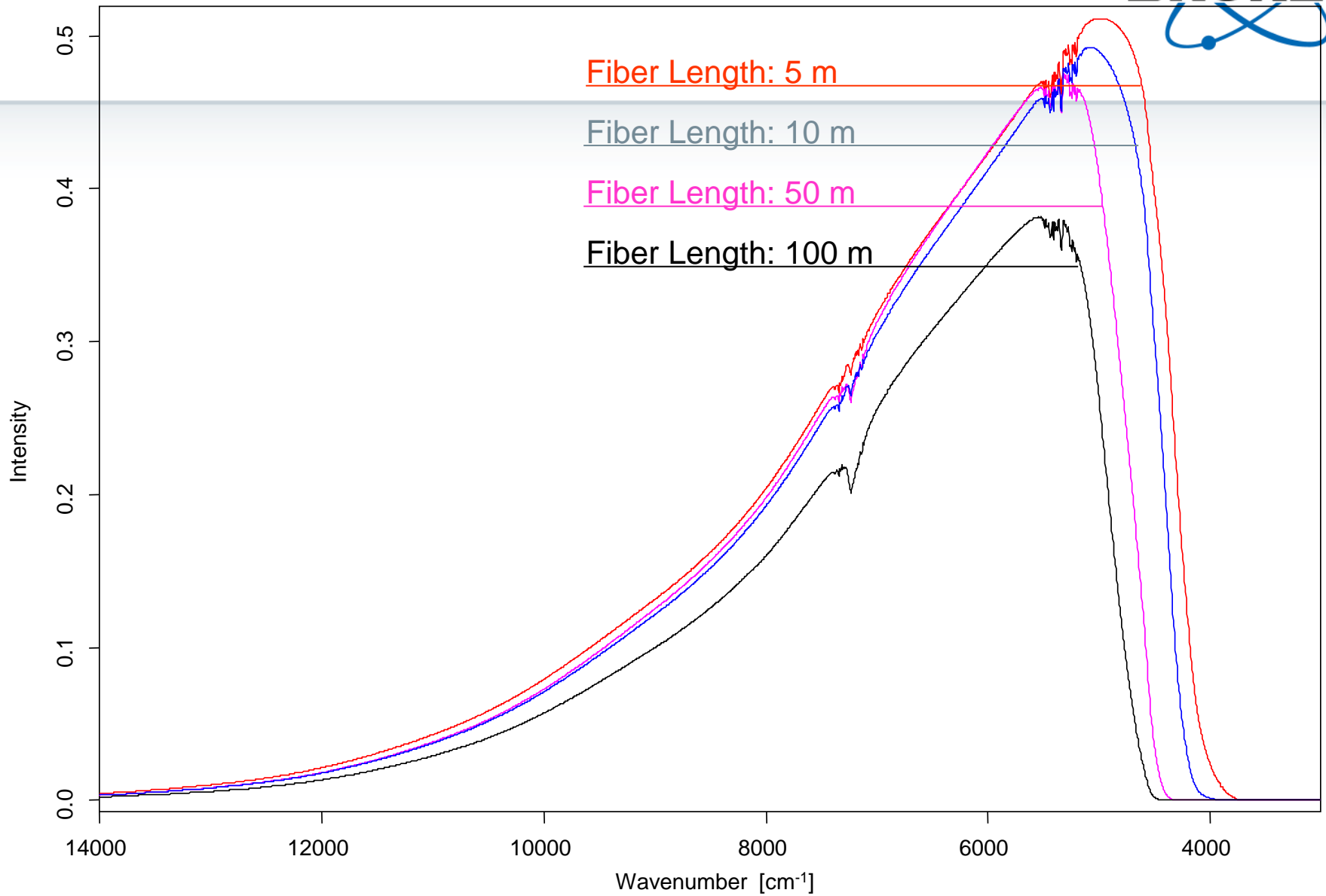


Probes

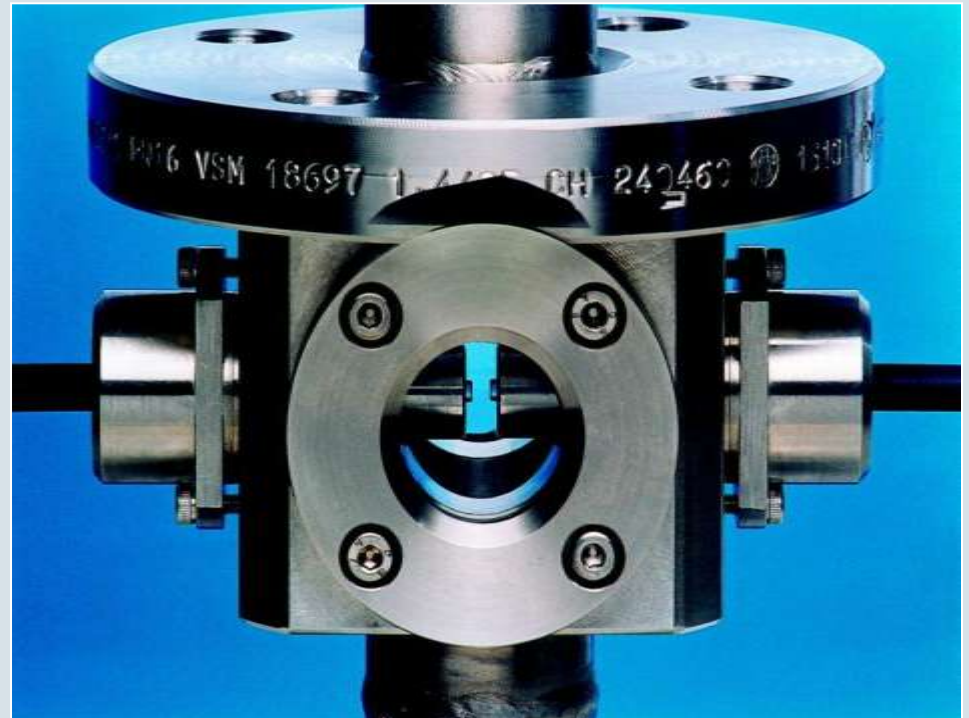


In-line transmission measurement





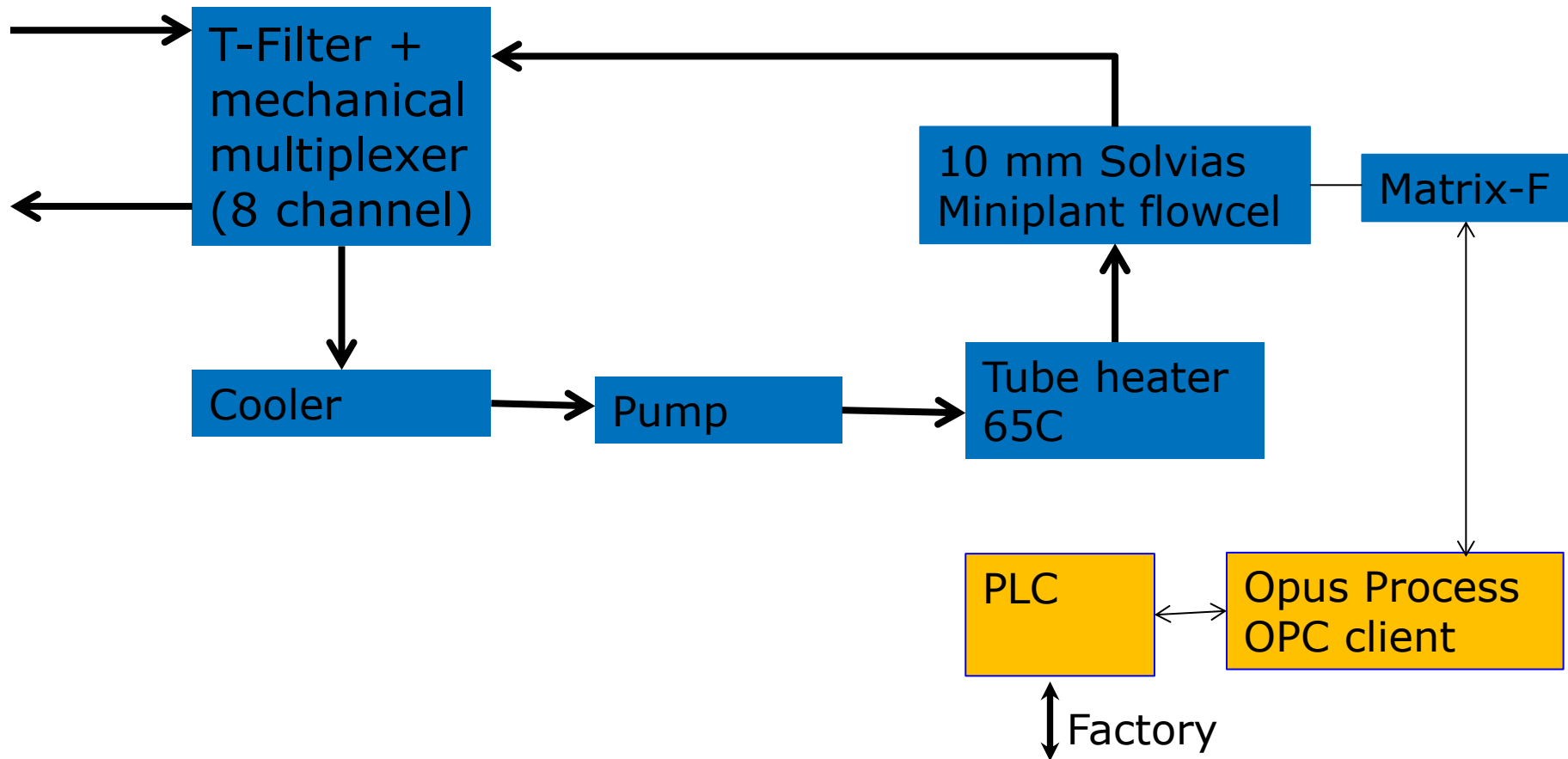
On-line transmission measurement



On-line FFA & Polars frying oils



Fast loops oils 80 °C – 220 °C

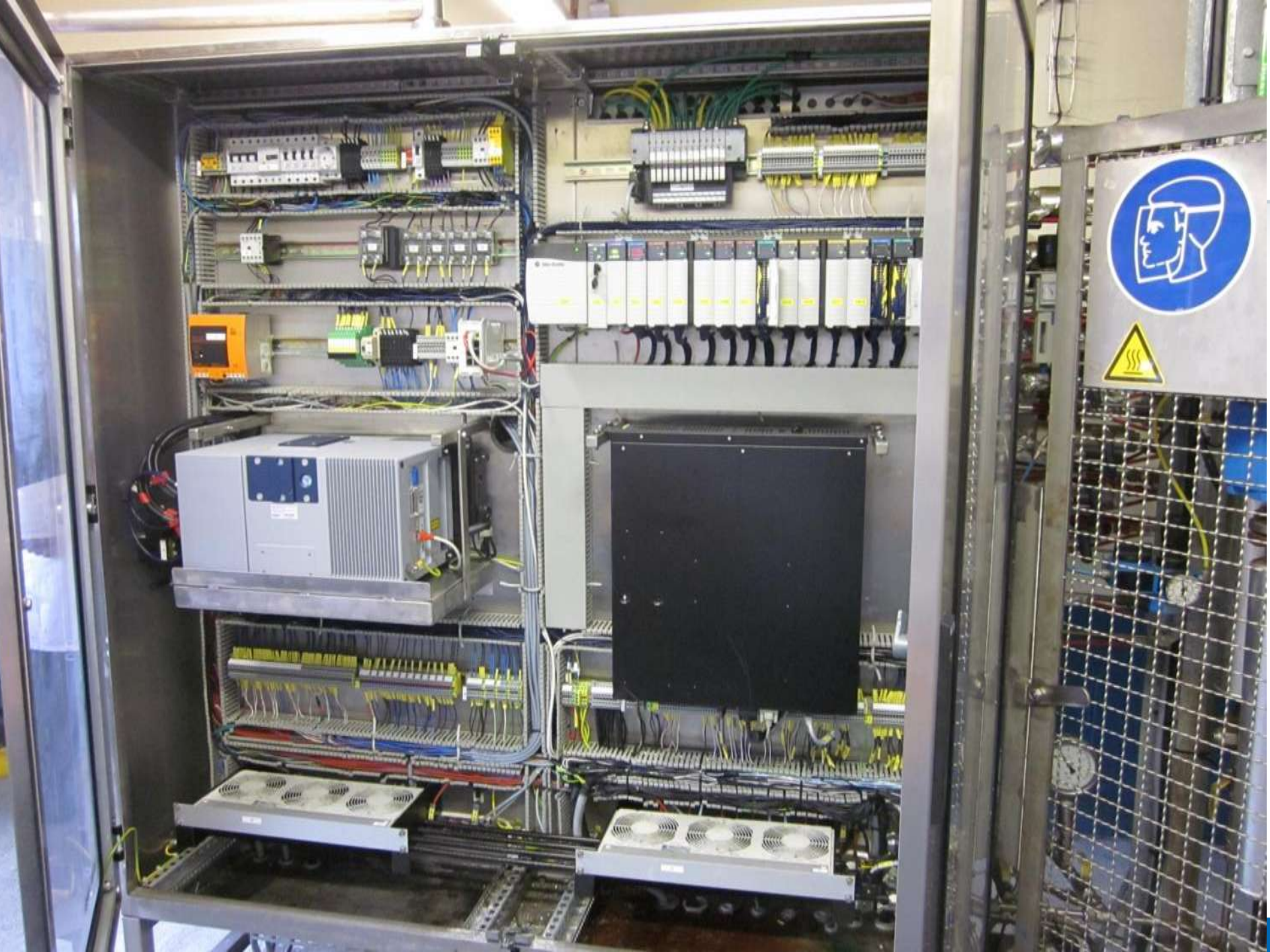




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OUTLET FLES
KLEP VII HORIZONTALA FLES
KLEP VII VERTIKAAL FLES IN 6

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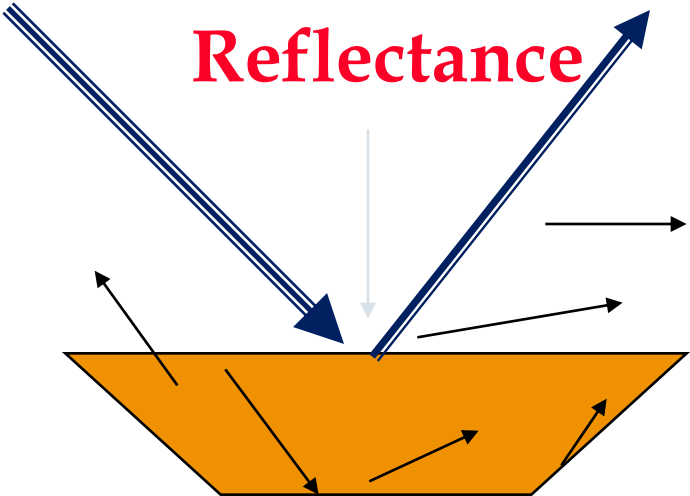
Measuring Mode: Reflectance

I_0 (initial)

I (resulting)

diffuse
Reflectance

Absorbance

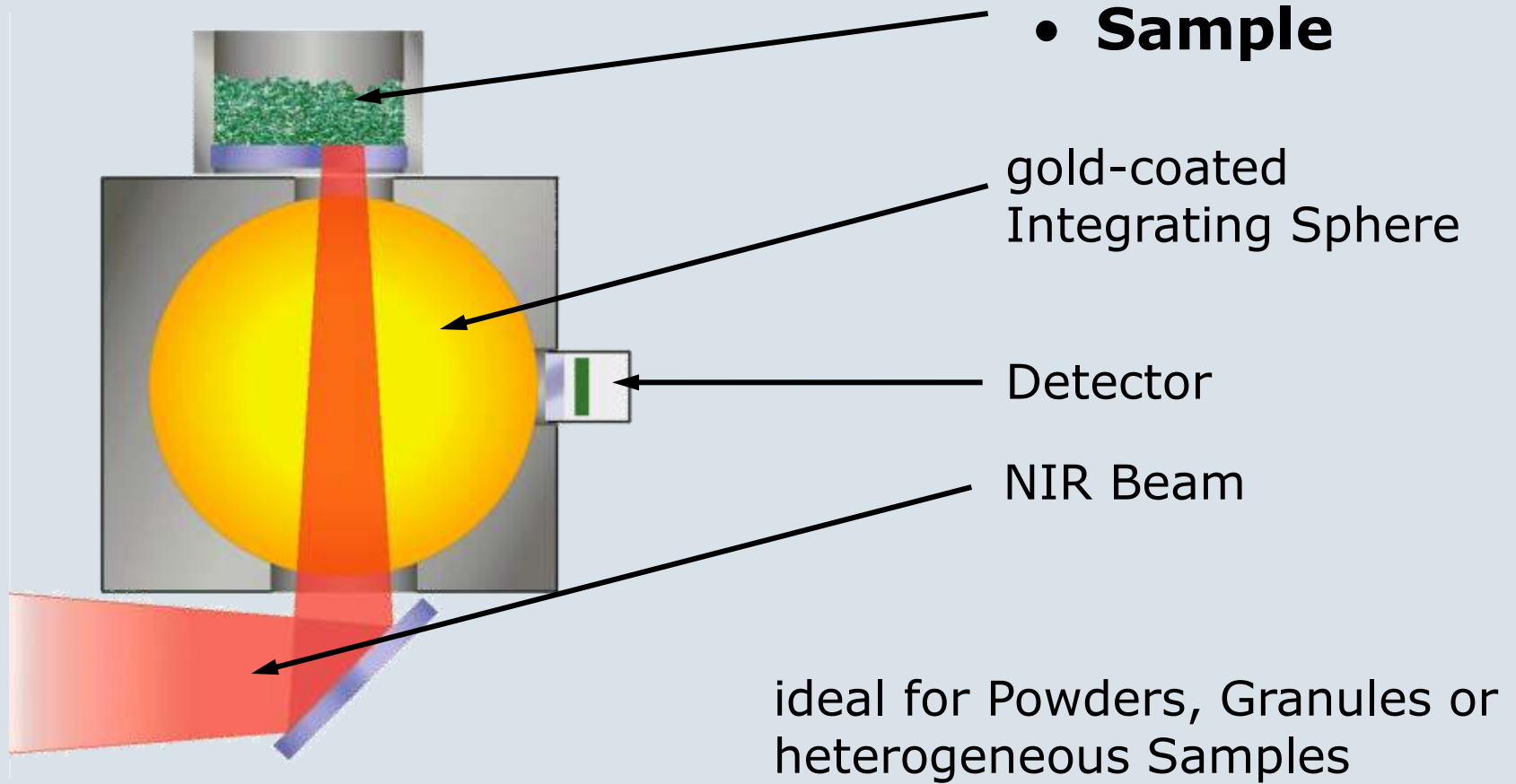


Sample

At-Line & Off-line Reflection measurement



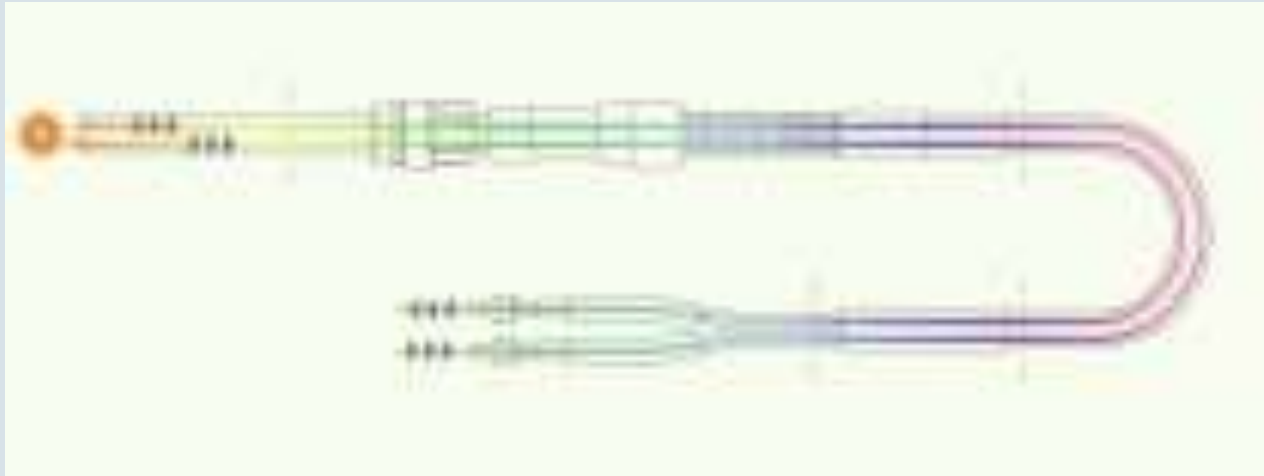
Integrating Sphere



In-line Reflection measurement



Solvias Albedo (2x7 fibers 600um, 5mm)



ALBEDO Reflection Probe at a Sifter in a dairy plant



On-line Reflection measurement

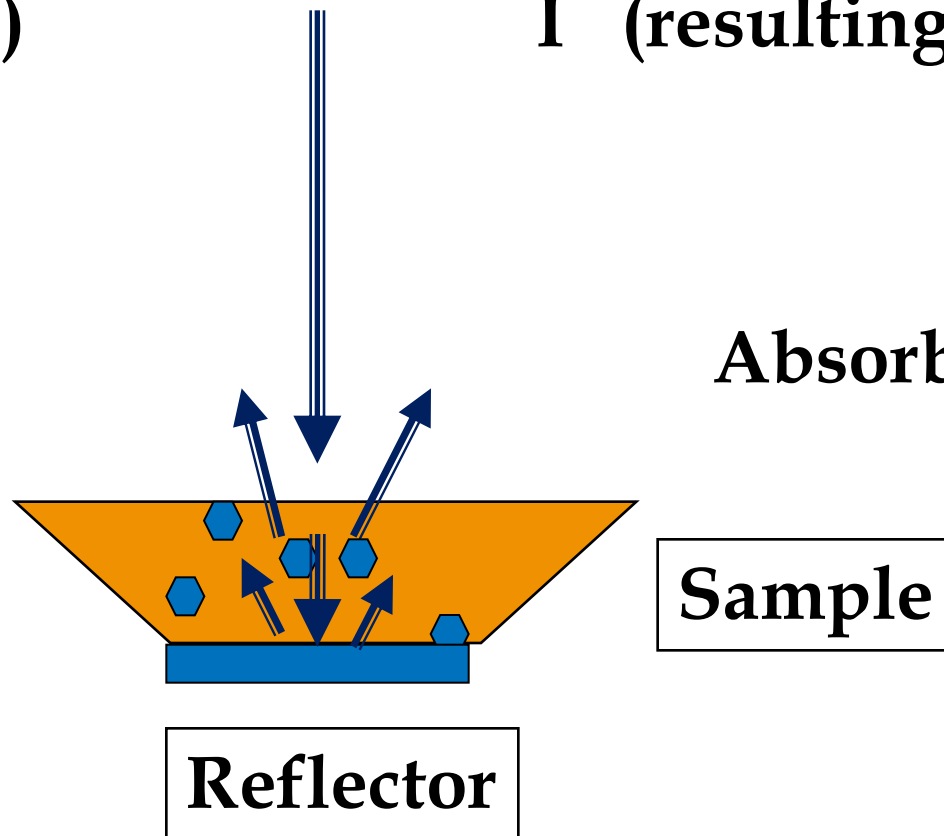


Measuring Mode: **Transflectance**

I_0 (initial)

I (resulting)

Absorbance



Reflector

Sample

At line transflection



In-line and On-line Process Spectrometer MATRIX-F (Transflection)



1+6 600um fiber



Installation in coffee creamer factory



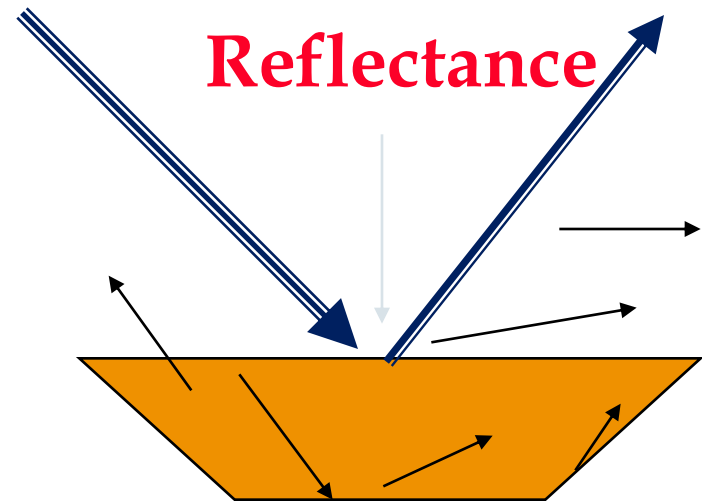
Measuring Mode: Emission (Non Contact Reflectance)

I_0 (initial)

I (resulting)

diffuse
Reflectance

Absorbance



Sample

Emission Head



2x 5 W NIR lamps

working distance: 10 cm

measurement area: 10 mm

protection class: NEMA 4

ambient temperature: max. 50°C

housing: stainless steel (1.4301)

sapphire window

*with **internal reference***

Q412-B Dust Protection (Air Shield)



Temperature
extension

Ex-protection

Distances till
100m

Single fiber

Oil-free Air (min. 1 bar)

Consumption approx. 1.500 L/h (at 1 bar/25°C)

Feed installation

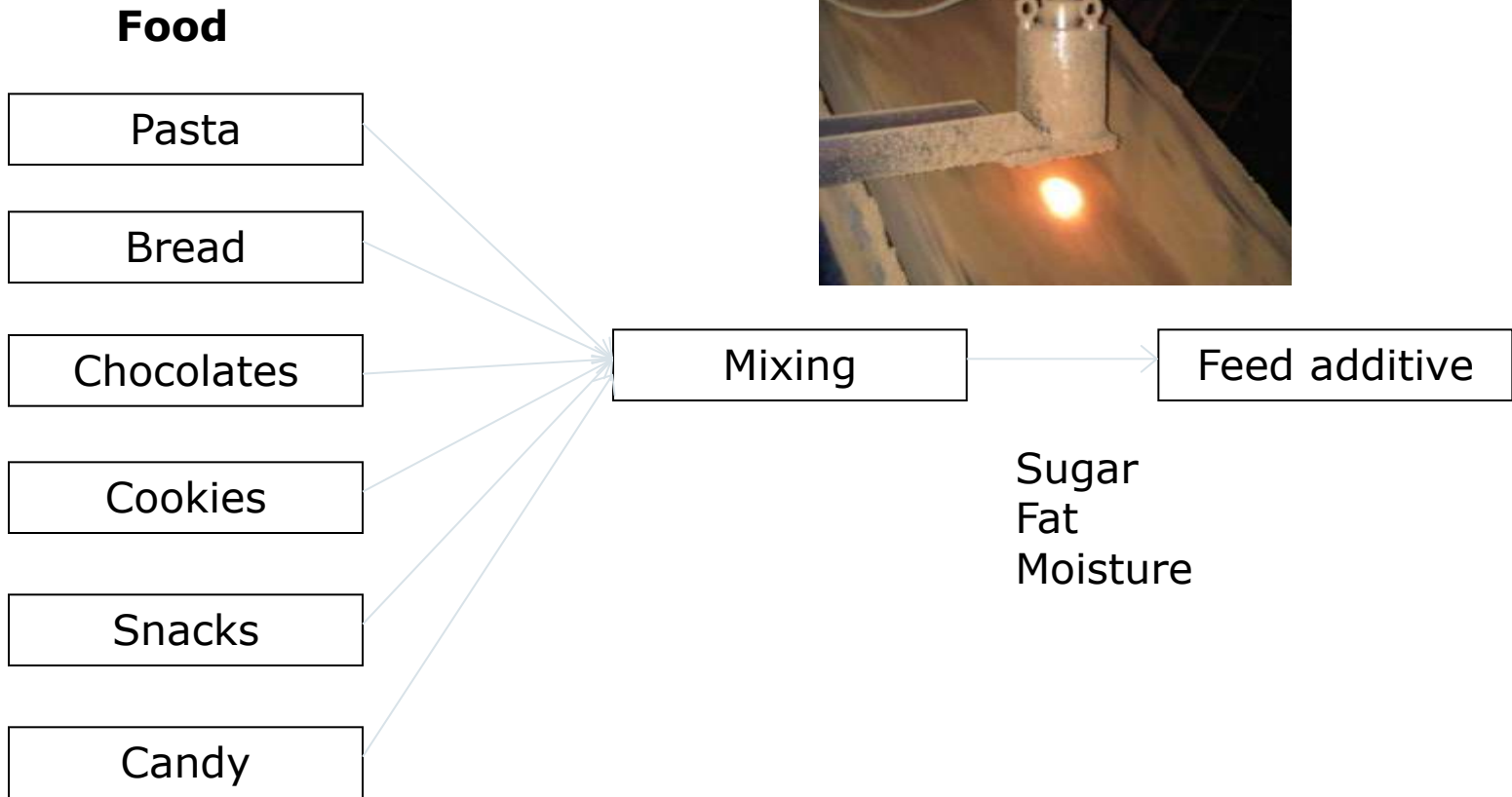


Flour mill installation



ATEX Emission head







Samsung Galaxy tab



Html page on Web server

Sugar	14.5%	
Fat	9.6%	21/12/10 14:12
Moisture	2.6%	
Status	OK	

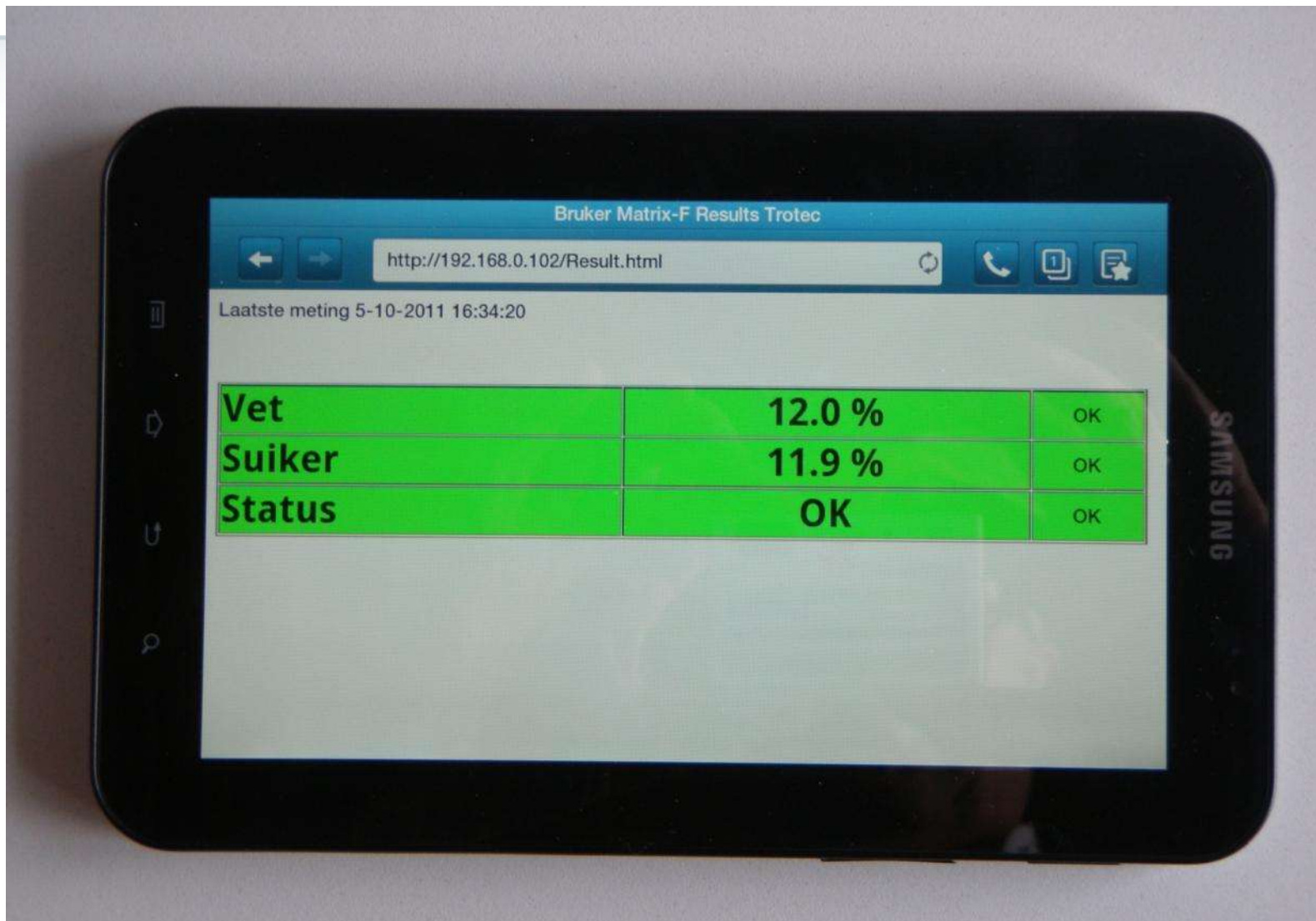
Internet

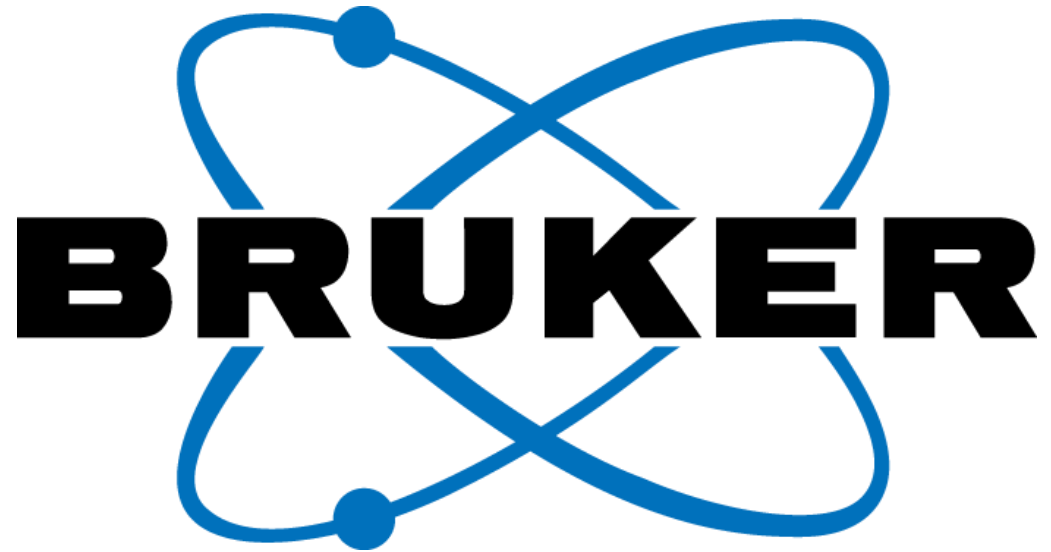


Samsung
Tablet-PC



Results





www.bruker.com