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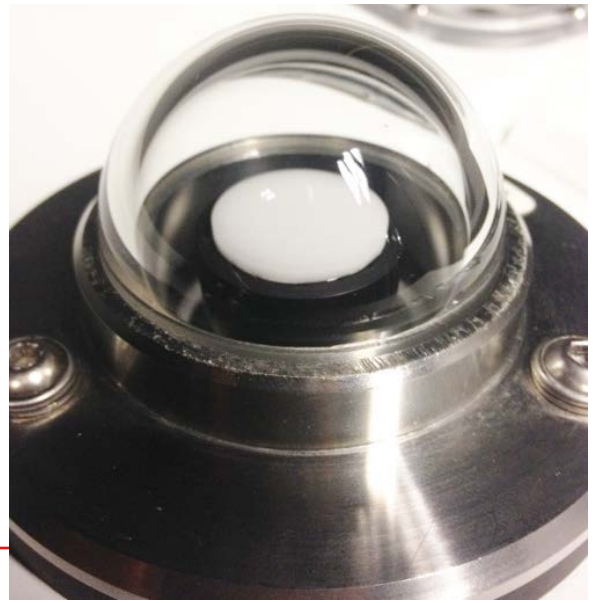
# An improved diffusor for the Brewer spectrometer



Passion for Precision

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Workpackage 4.2 within project EMRP ENV03

# *"Traceability for surface spectral solar ultraviolet radiation"*

Aalto / Kipp & Zonen / CMS Schreder

GOAL: reduce measurement uncertainty

Passion for Precision

# INTRODUCTION:


UV spectrometer

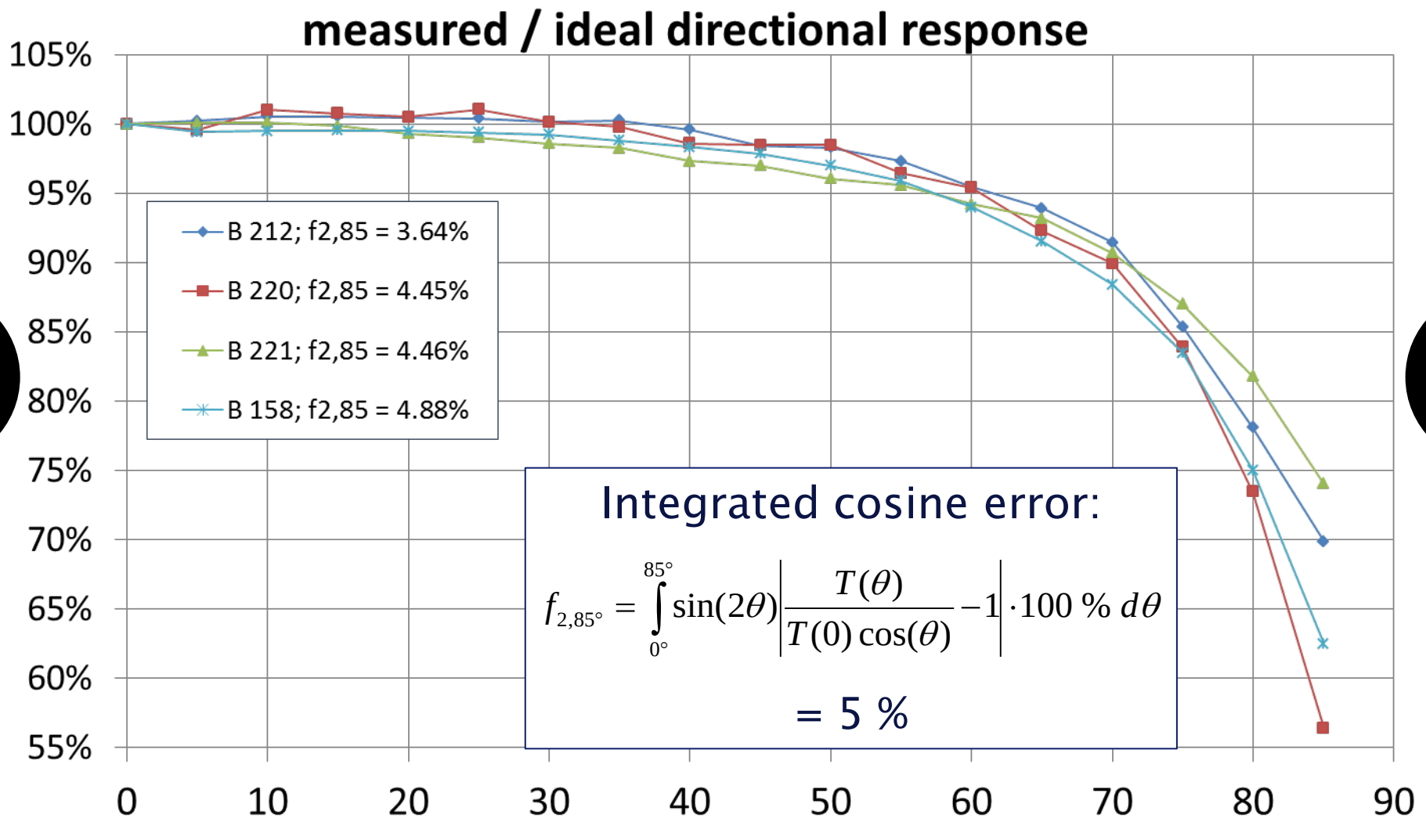
Wavelength range: 286 – 365 nm

Wavelength resolution: 0.6 nm

Direct and Global measurements

Ozone Calibration

# Directional response



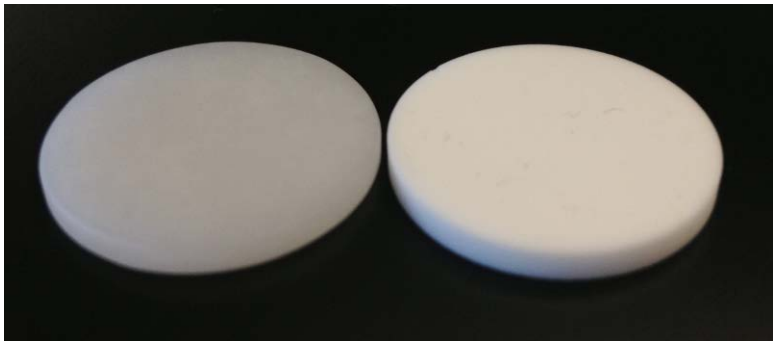
# Approach:

1. **Material studies**
   - Teflon samples
   - Sintered quartz samples
2. **Simulations** (T. Pulli, AALTO)
   - Physical model for light propagation inside diffuser structures.
   - Monte Carlo algorithm for calculating cosine response of diffusers.
3. **Build prototype Improved diffuser design**
4. **Testing and Qualification**

# Tested samples:

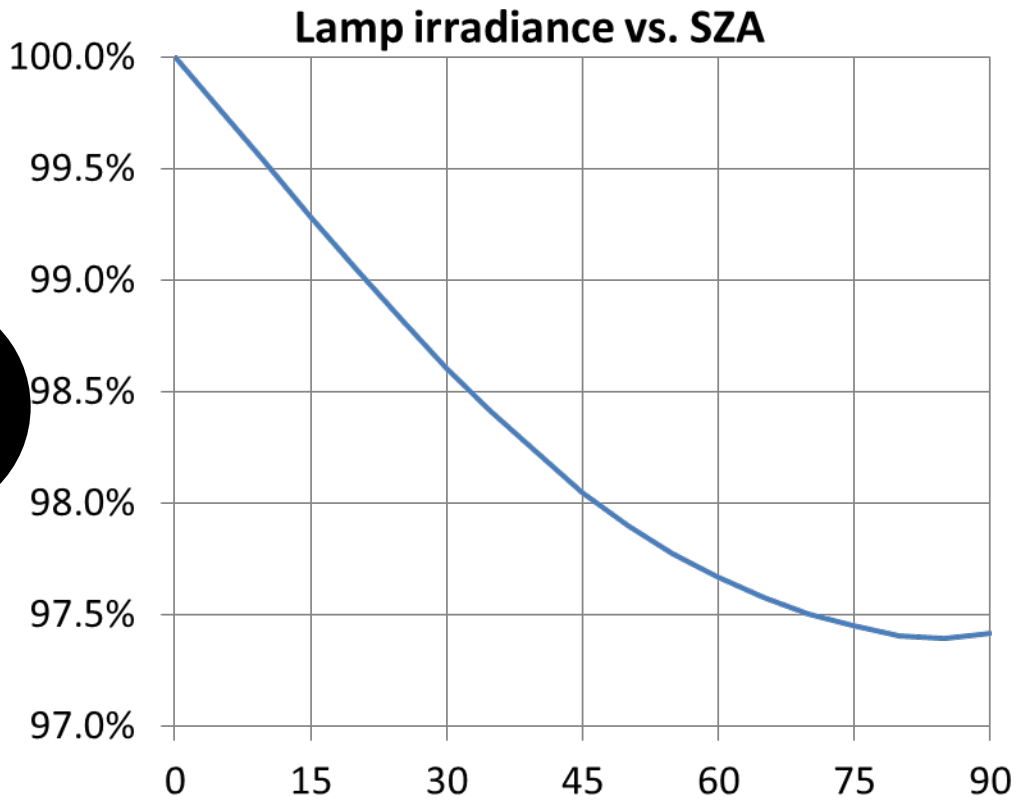
SHAPED TEFLON DIFFUSER:

QUARTZ DIFFUSERS: sandblasted / sintered

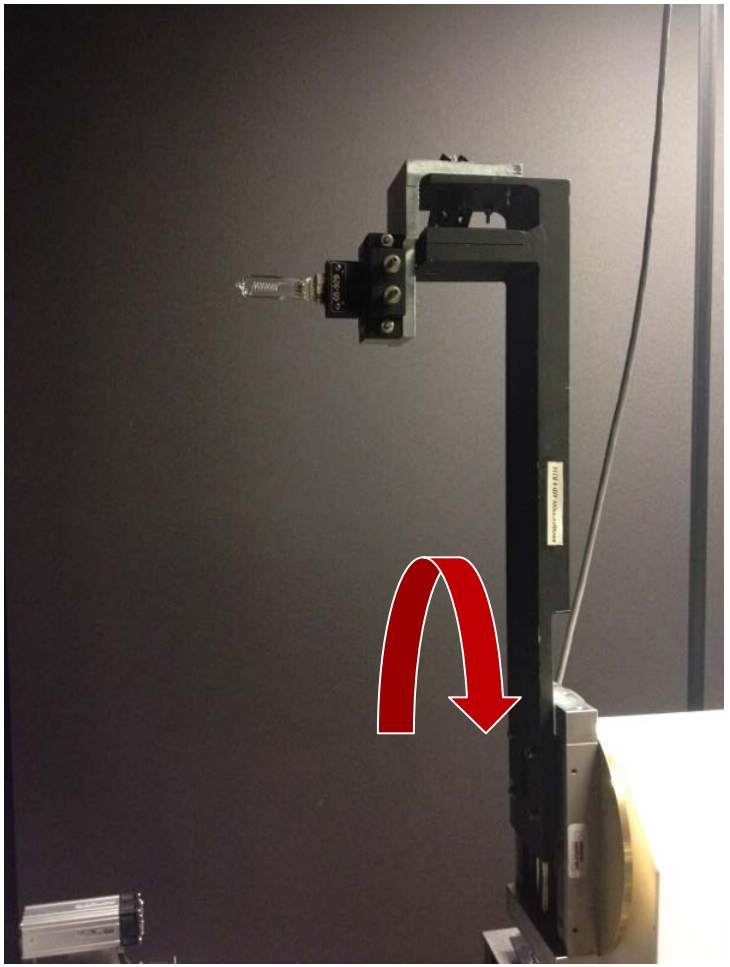


GLOBAL PORT: CMS Schreder uv-j1015

# Experimental setup

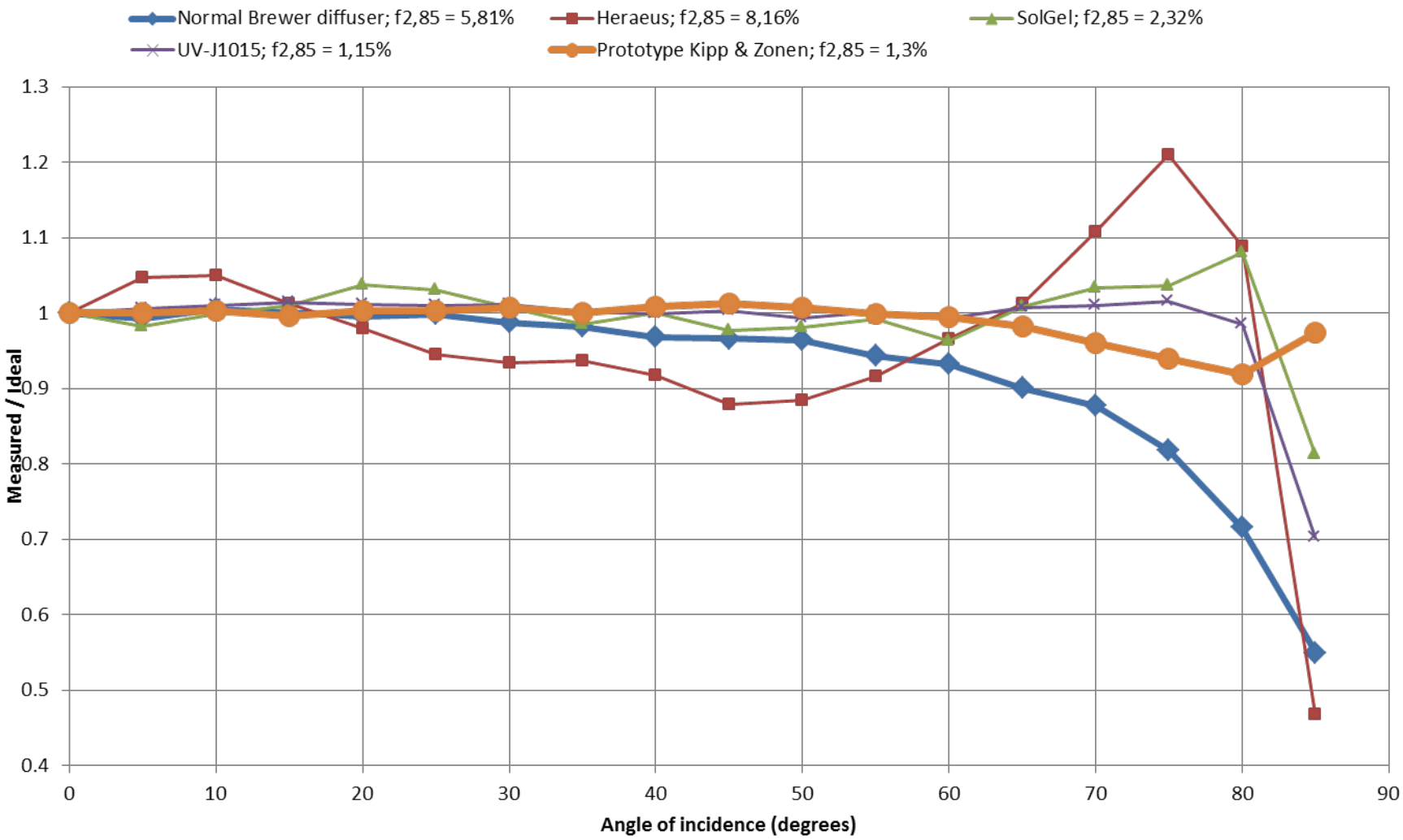



Measured at normal incidence

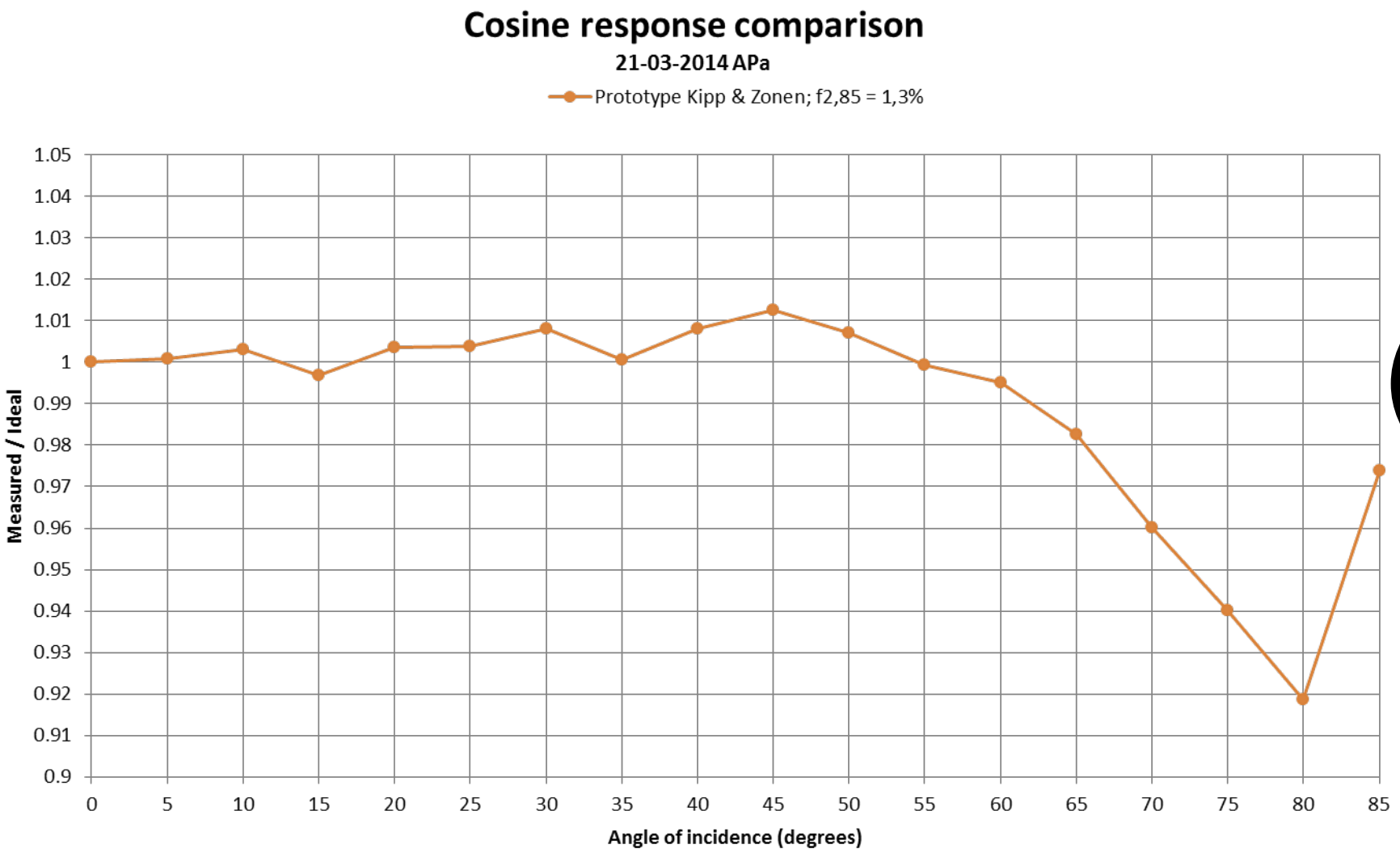


Directional response facility

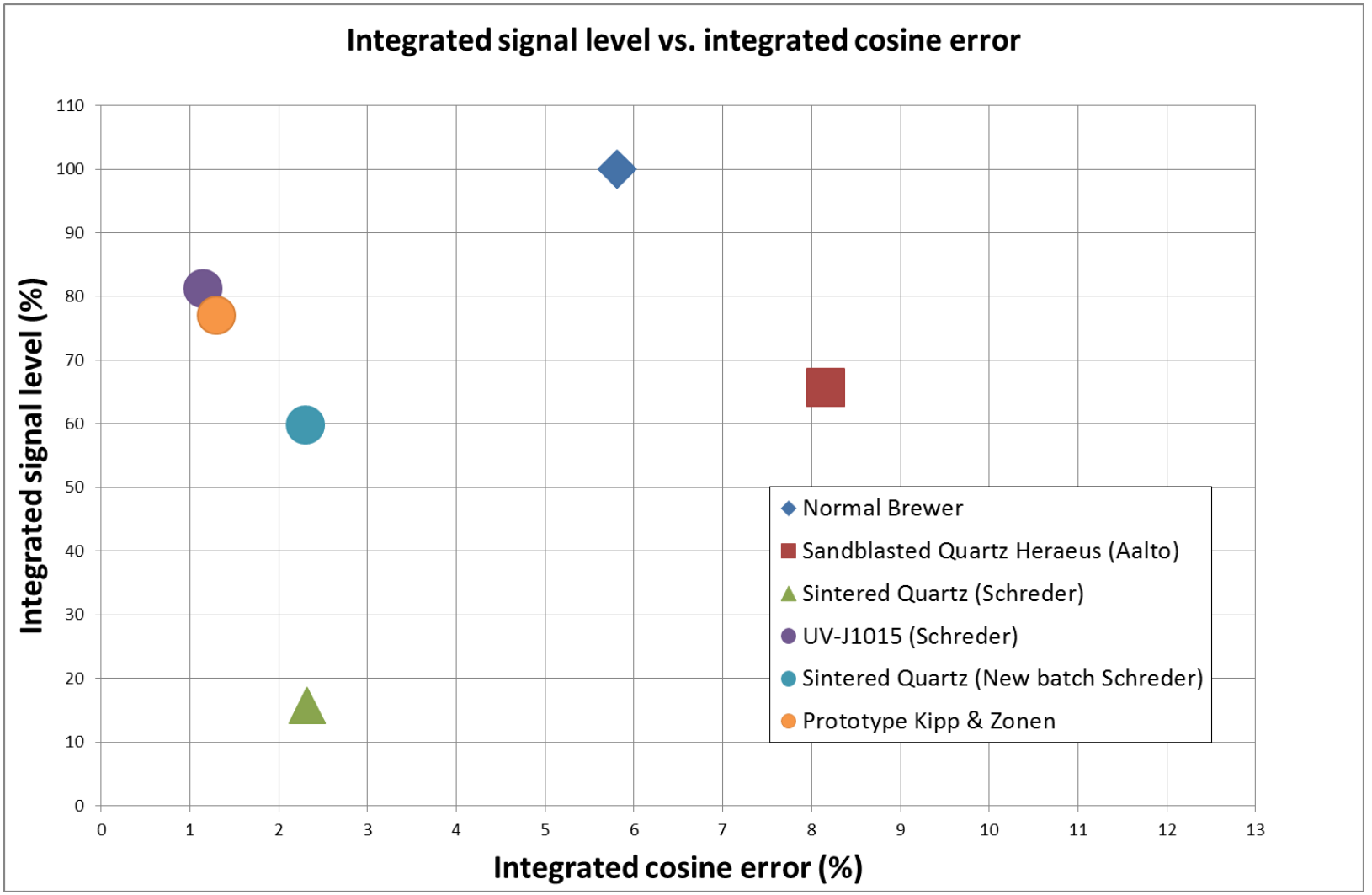
# Directional test results



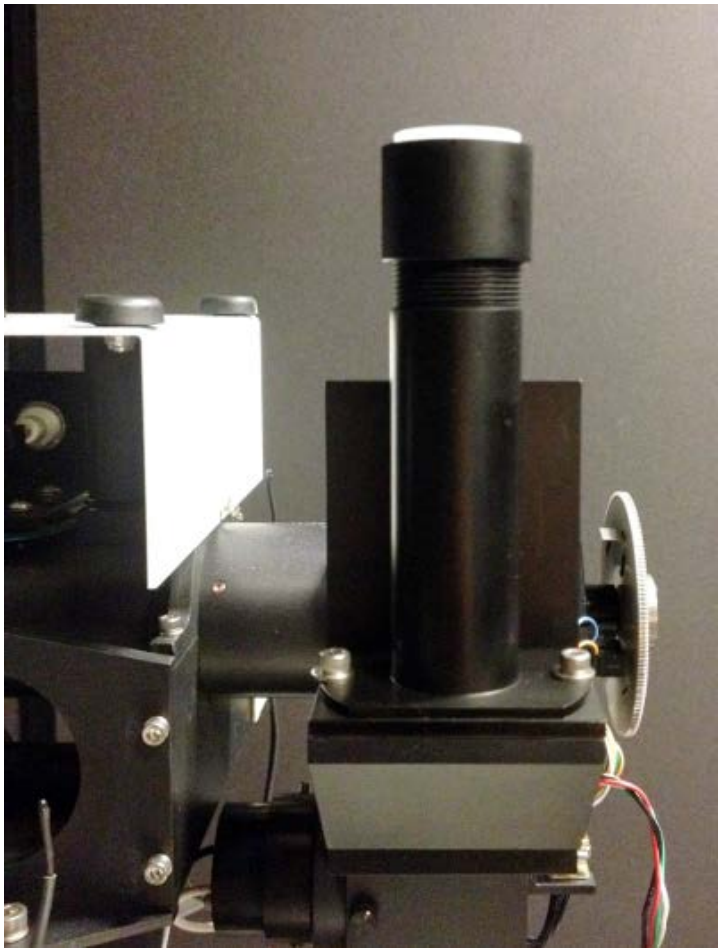
# Directional test results



# Experimental results



# Prototype diffusor:



# RESULT:

Goal set in EMRP project: $f_{2,85} < 1\%$

Restriction (Kipp): Transmission reduction: max. 50%

Teflon:

T= 80%

$f_{2,85}$ = 1.2 %

Sintered Quartz

T = 70%

$f_{2,85}$ = 1.3%

<u>advantage:</u>

- no Transmission change with temp.
- No aging

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# Thank you for your attention