

**Status Report about the
Investigations to the
Test method
For the Sun Load Impact**

(Working Title „Phantom effect”)

Report to GRE 75

Background

First Results

Further Results

Conclusion

Open Point

The clear recognition of the signals is very important!

Which situations have an influence to the detection of signal lamps?



Studies have shown that

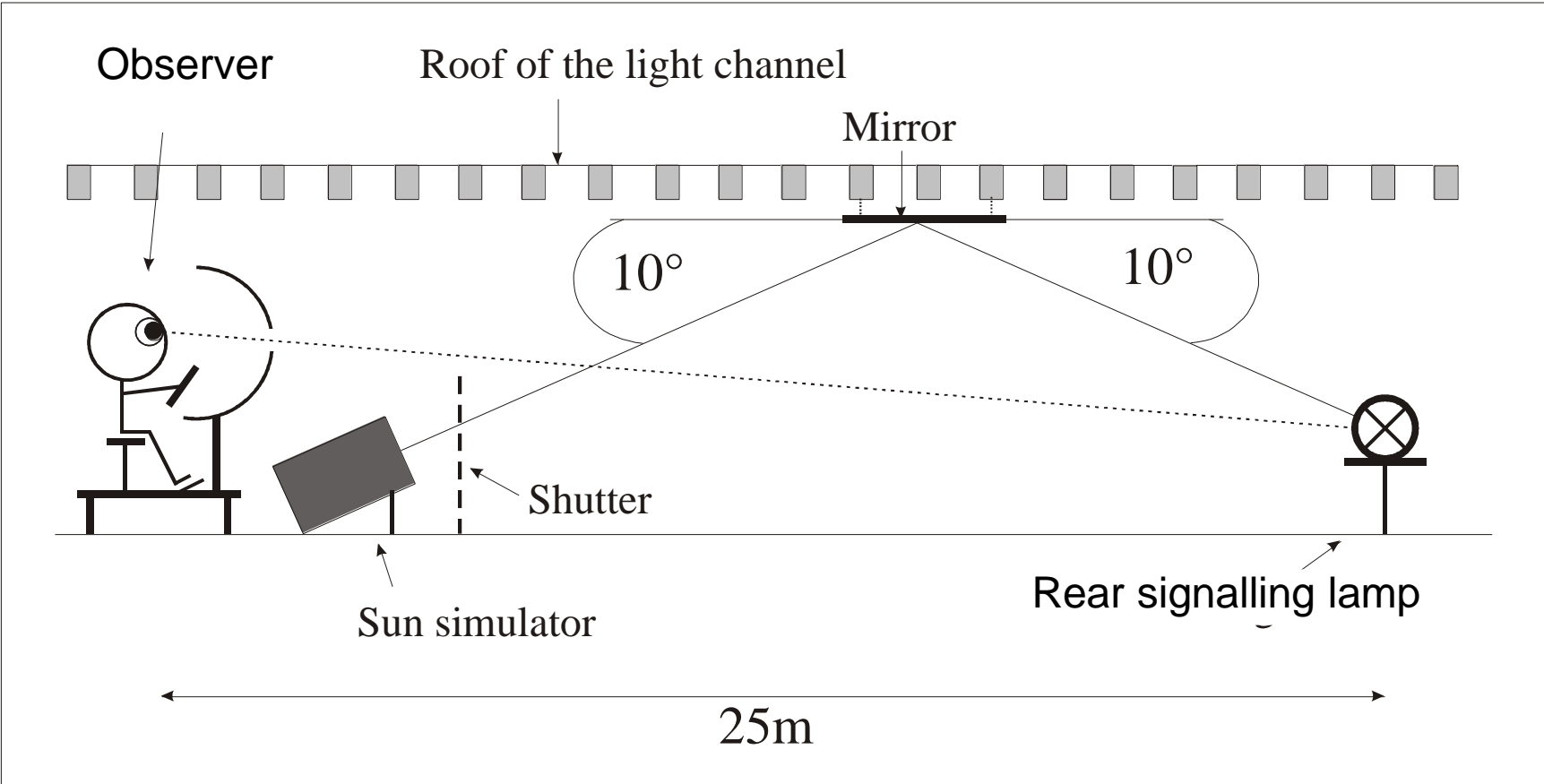


- approximately **65 %** of all rear end accidents and
- approximately **50 %** of all crossroad accidents

could be avoided if the driver has **0,5 seconds more reaction time.**

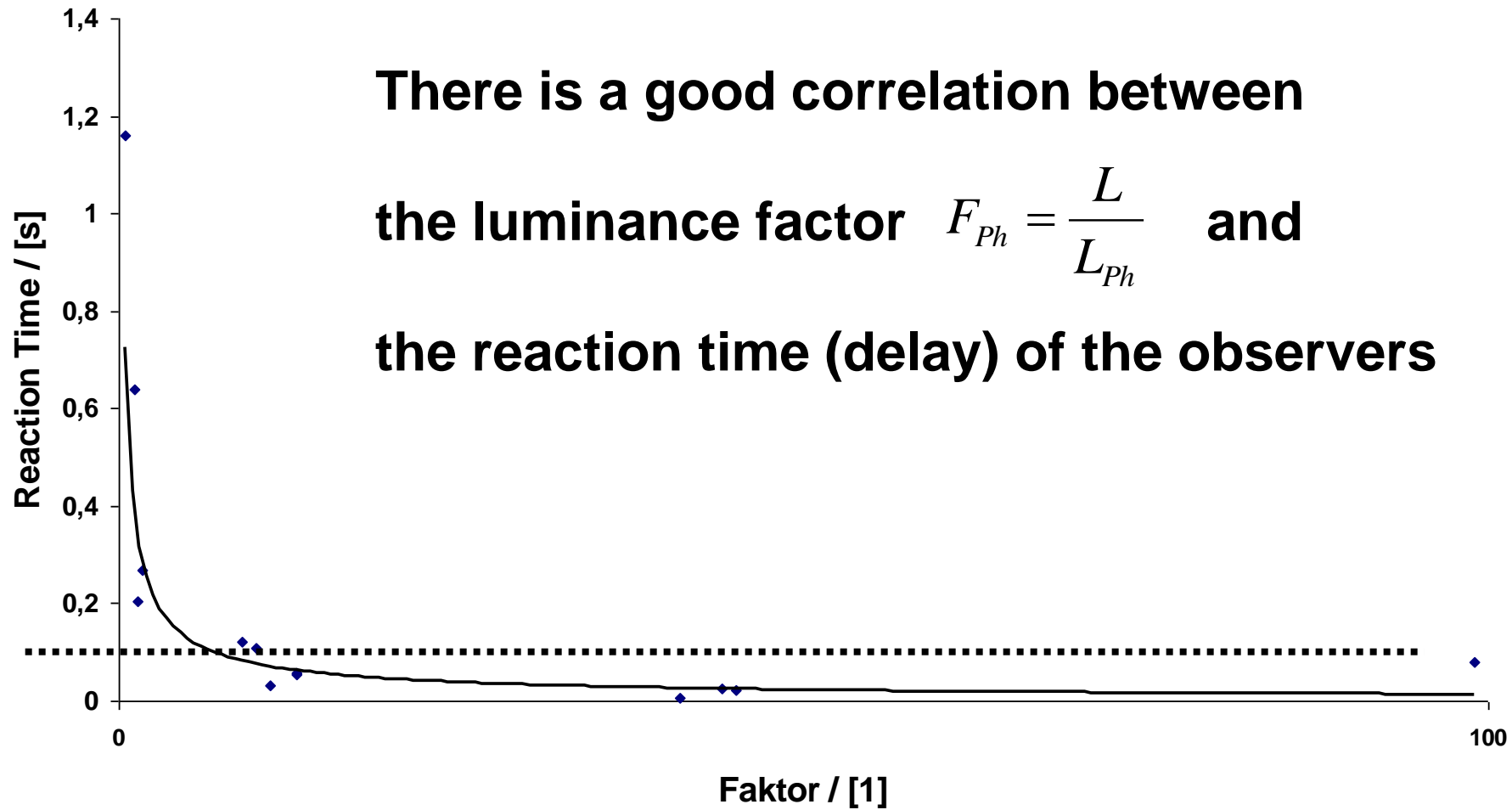
[Enke]

First Investigation



Principle Test set-up

Results of the first Investigation



Principal Test Method

Evaluation only for signal area relevant for the signal

Procedural method

Generation of a mask from the signal area

- Pixels with luminance higher than 11 000 cd/m² = **1**
- Pixels with lower luminance = **0**

Test Criterion

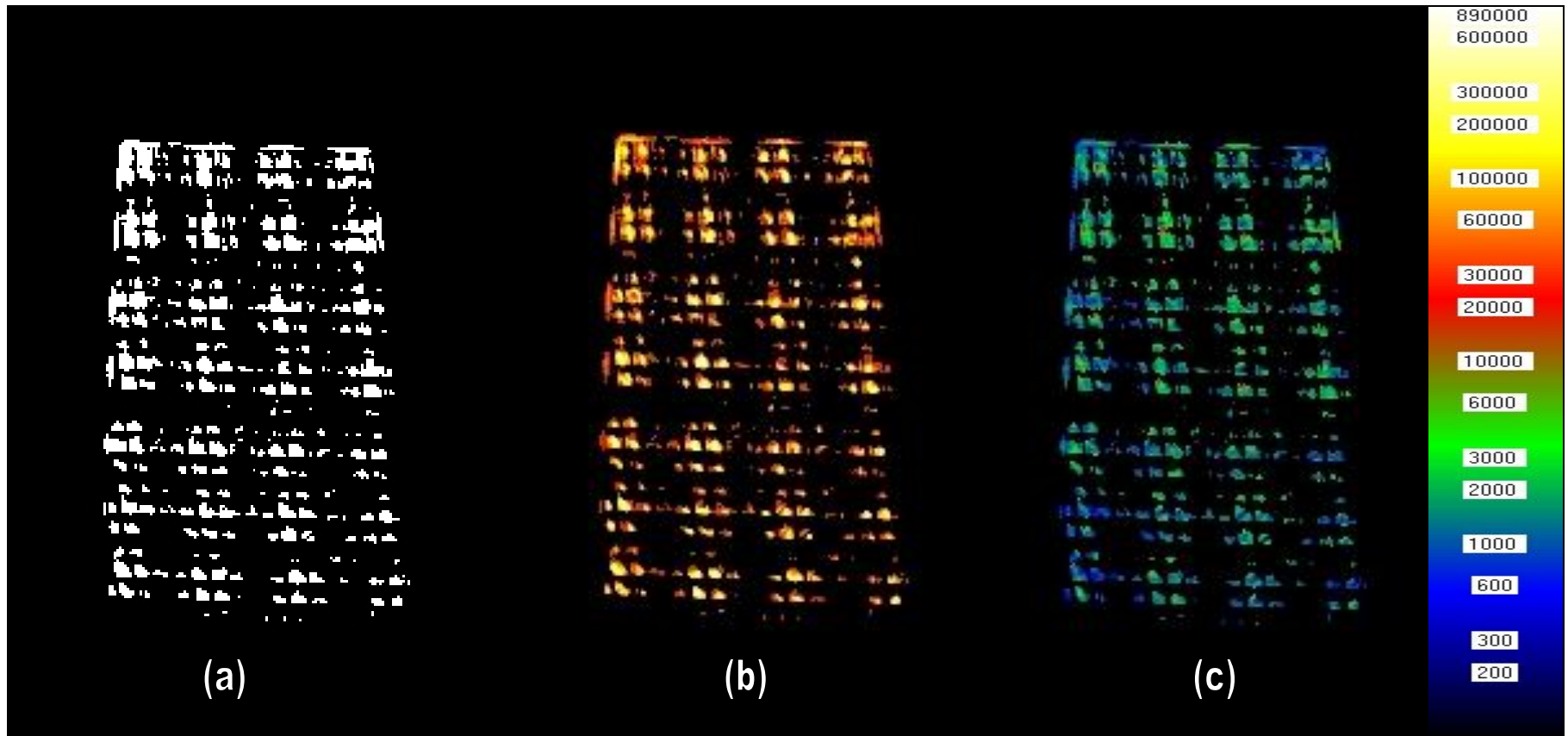
$$F_{Ph} = \frac{L}{L_{Ph}}$$

L Mean luminance of the signal

L_{Ph} Mean luminance of phantom by irradiation with sun light and switched off signal

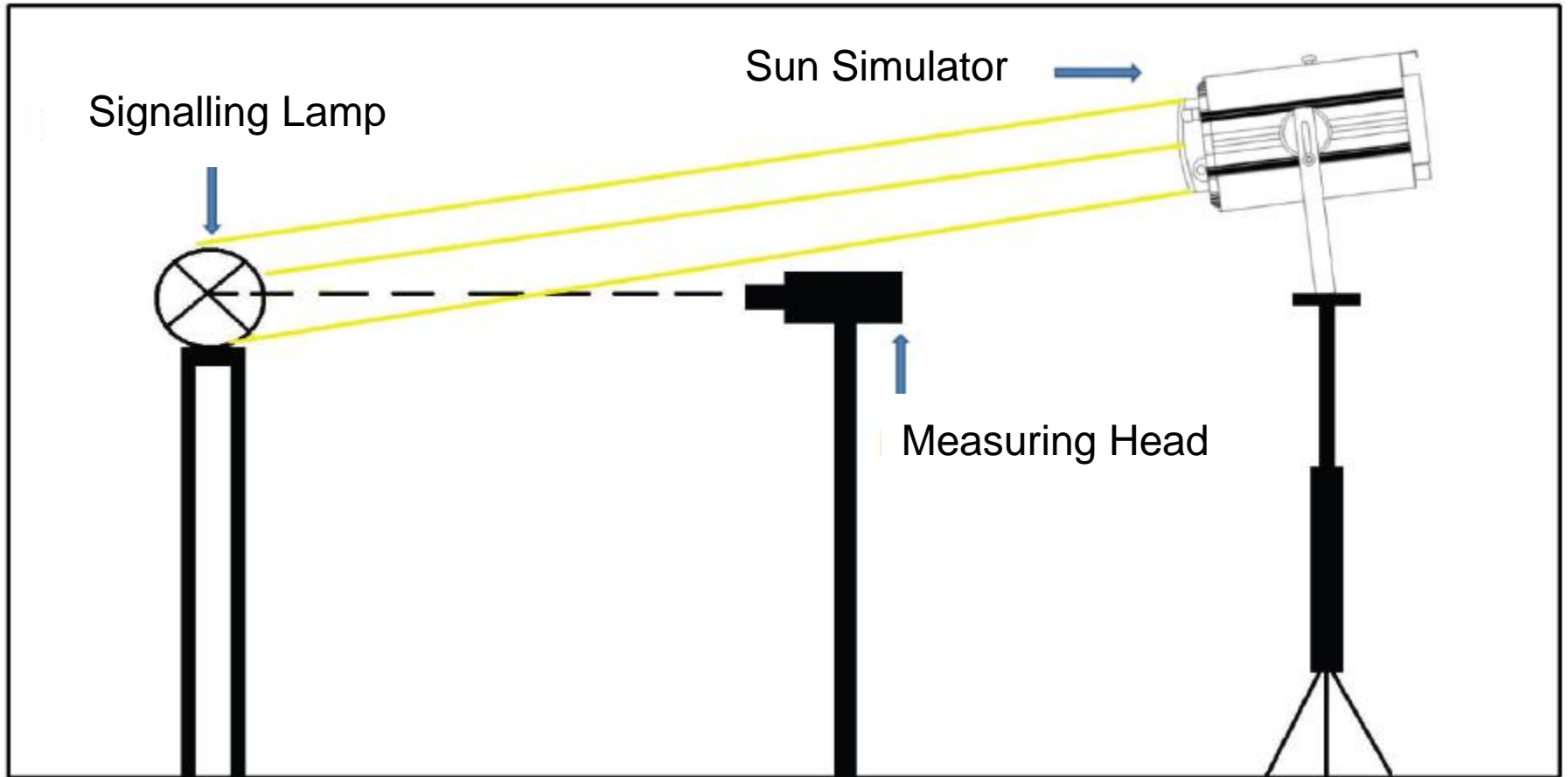
F_{Ph} Minimum value of super elevation from the luminance of the signal L to the luminance of the phantom light L_{Ph}

Signal turn indicator

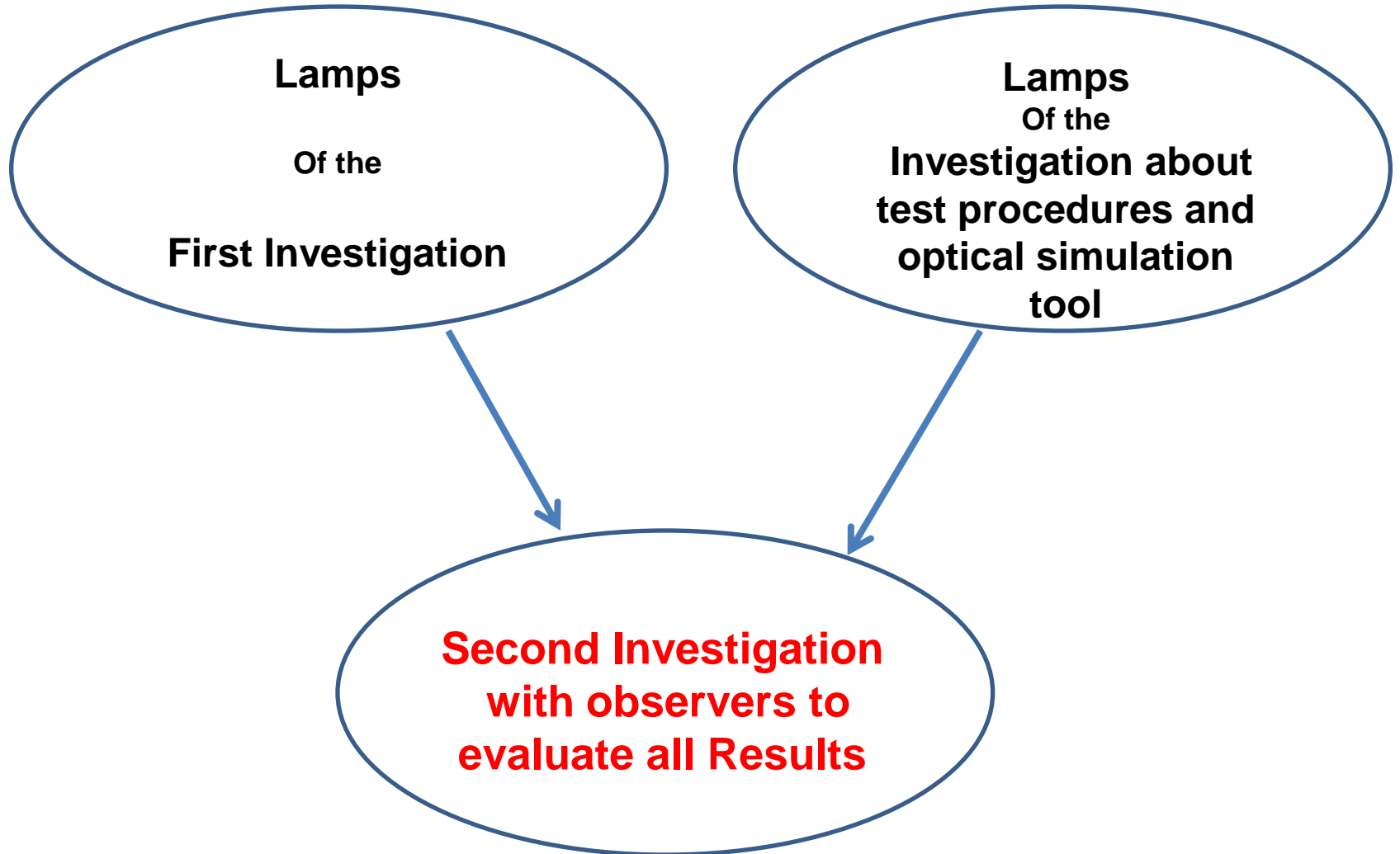


Luminance pictures (signal indicator) (a) mask, (b) luminance of signal, (c) luminance of phantom

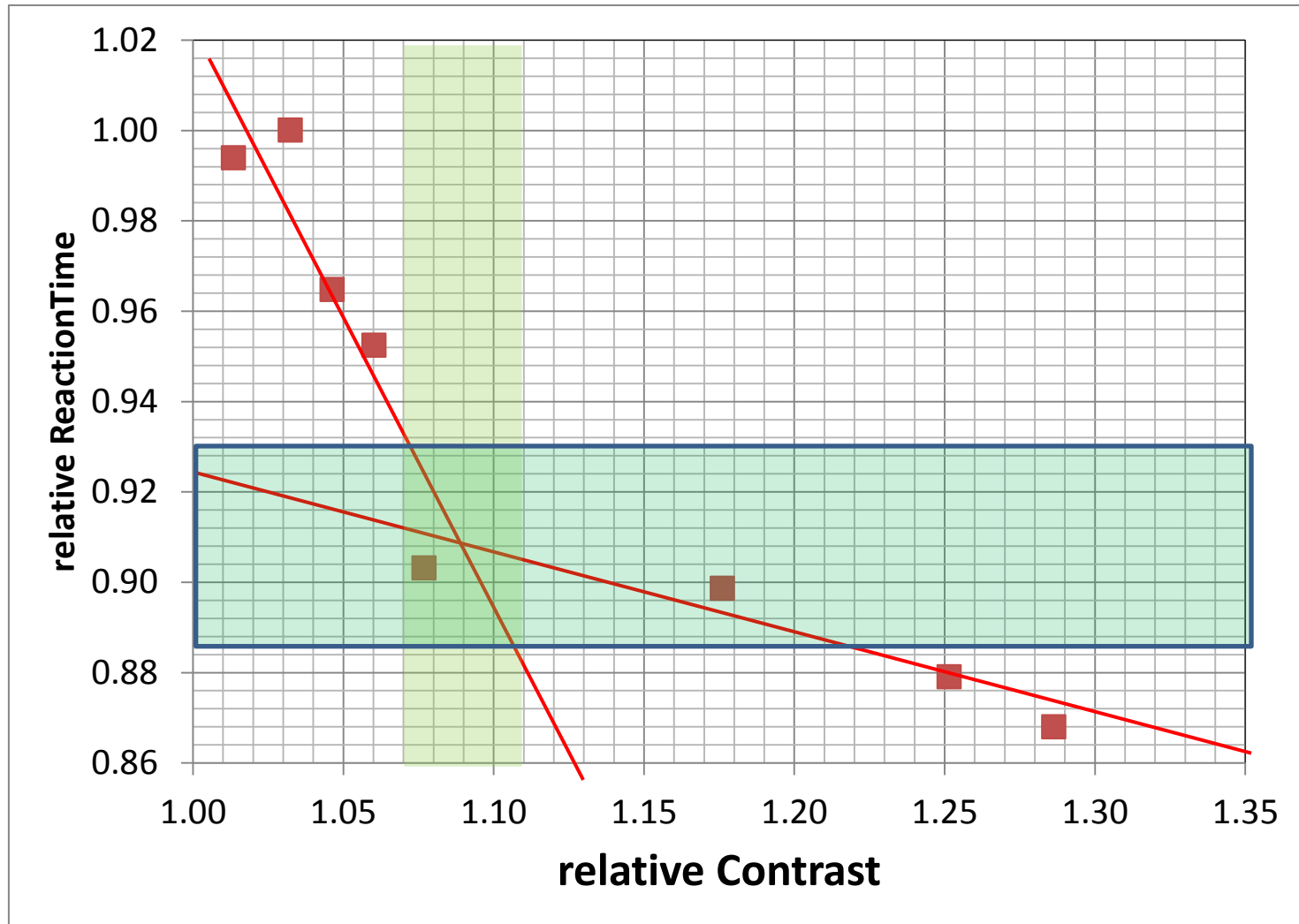
Investigations how to measure it and is it possible to implement these test procedures into optical simulation tool by the manufactures



New Investigation



New Investigation



Proposal for Regulation No. 6 and Regulation No. 7

Regulation 7

1 Proposal

Add a new paragraph 7.7. to read:

- 7.7. The sun load impact for stop lamps of the category S1 to S4 shall be measured according annex 8 to this Regulation. In the case of the categories S2 and S4 with variable intensity, only the higher level (state) will be measured. The ratio F_{ph} shall be not smaller than [X].**

Add a new Annex 8. to read:

ANNEX 8 Measurement of the sun load impact

For measurements of sun load impact the stop lamp shall be carried out with its light source as required in paragraph 7 to this Regulation.

The light source generating a sun load impact according to Figure 1 below is a projector with a light source of a correlated colour temperature between 4500 K and 6500K.

The light from the projector shall illuminate **at least** the light emitting surface of the optical unit with the illuminance $E = 40\,000$ lx and uniformity (inside the area of the light emitting surface) of 10 %.

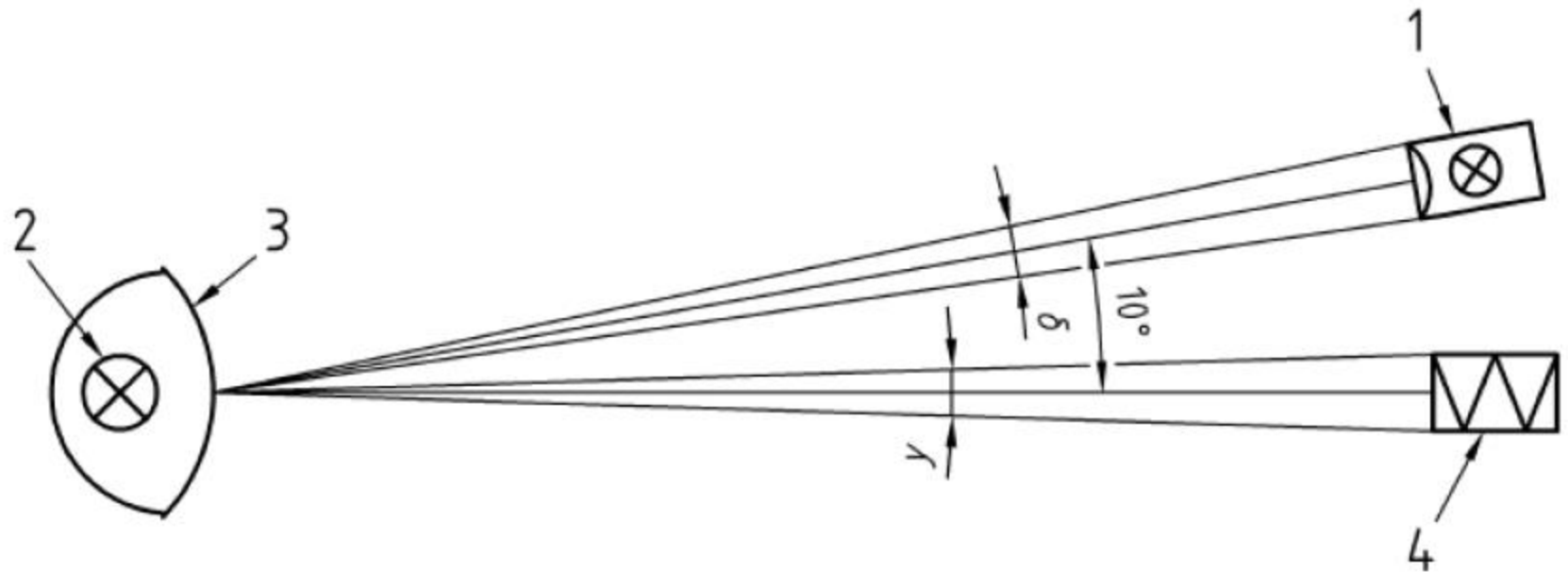
The reference axis of the stop lamp and the axis of the projector shall form an angle of 10° .

The plane formed from both axes shall be the operational vertical plane. The arrangement shall be in a way that the projector radiates the light as if from above the signalling lamp.

If the illuminance E_1 on the light emitting surface of the stop lamp cannot be realized the illuminance $E = 40\,000$ lx for the sun load impact, the luminance L_{ph} can also be calculated for the lower illuminances E_1 from the corresponding measured lower luminance L_{phl} :

$$L_{ph} = L_{phl} \times \frac{40000\text{lx}}{E_1}$$

However, the illuminance E_1 shall be not lower than [10000lx].



Key

- 1 projector
- 2 signalling lamp
- 3 plane of the light emitting surface
- 4 measuring head

Figure 1 Typical arrangement for the measurement of the luminous intensity produced by the sun load impact

Measurements of sun load impact depend strongly on the geometry of measurement. The recommended distance for measurements for obtaining comparable results is 10m.

The measuring head to determine the luminance shall be placed so that the reference axis of the stop lamp and the axis of the measuring head coincide.

The mean luminance L_{ph} shall be determined in the plane of the light emitting field area of the stop lamp with switched on projector and shall to be measured while the stop lamp is switched off.

The mean luminance L_s shall be determined in the plane of the light emitting field area of the stop lamp with switched on stop lamp and shall to be measured while the projector is switched off.

In both cases, it shall be noted, that the measuring head or respectively the measuring system to determine the mean luminance catch the complete light emitting area of the stop lamp to be measured.

The ratio F_{ph} between the luminance L_s of the real signal and the luminance L_{ph} of the sun load impact is given as:

$$F_{Ph} = \frac{L_S}{L_{Ph}}$$

Open point to do:

With regard to the test criterion “Mean Luminance”:

For measurements of the signal and sun load impact to determine the Factor:

Requires a more precise description;

Possible Measuring procedures:

a)Relative measurement ;

- **Simpler measurement equipment;**
- **Relative difficult evaluation of the area to be measure;**

b) Luminance measurement with the application of an filter;

- **More expensive measurement equipment (absolute measurements);**
- **Easier evaluation of the area to be measure;**
- **More precise Results:**

All these methods must be seen in correlation to the results of the latest Investigation to set the threshold factor.

Thank you for your attention !