Bring photometry to individuals

by applying a specific K_{cd} value for each person

Extracted from “manipulation de physique”
A. Leduc, 1895

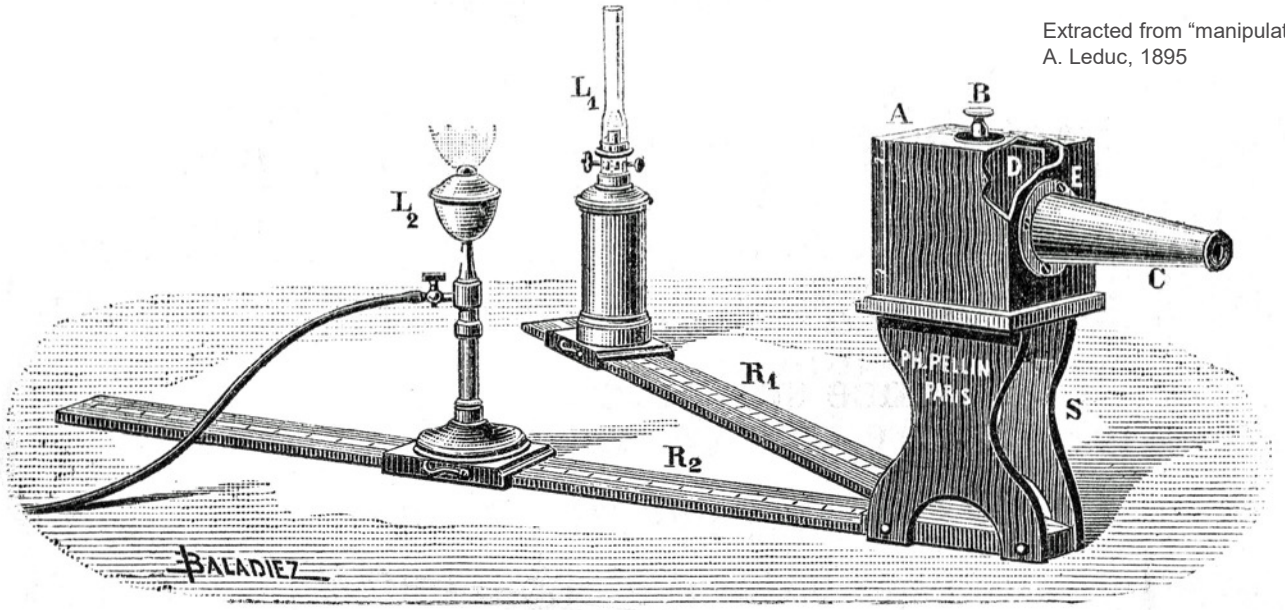
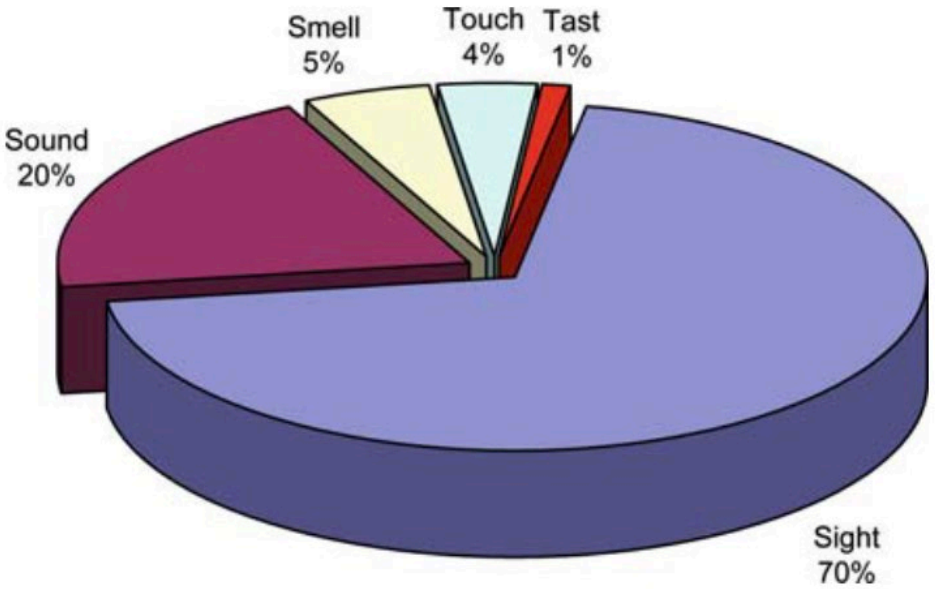


Fig. 71. — Photomètre de Foucault.

Gaël Obein

LNE-Cnam (FR)

I need a measurement of light that reflects what I perceive



Schroeder, R. (1996) *Possible Worlds: The Social Dynamic of Virtual Reality Technology*, Westview Press. (HarperCollins Publishers, Inc.).

because I am a diurnal mammal that primarily navigates its environment using sight

I need a measurement of light that reflects what I perceive

because I am a diurnal mammal that primarily navigates its environment using sight

Photometer

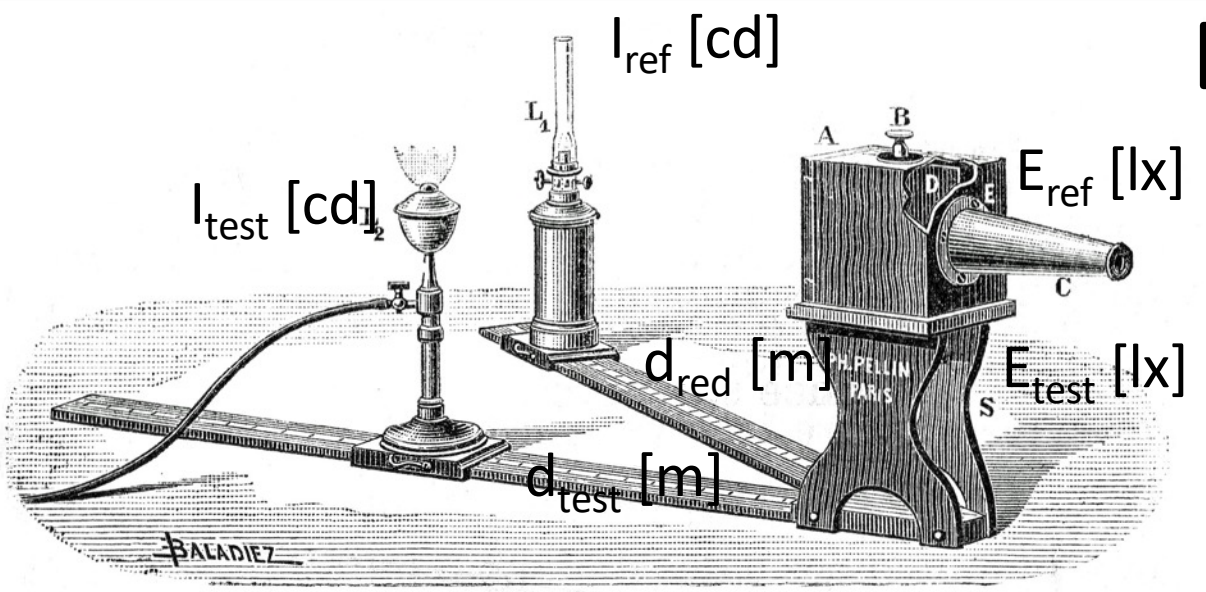
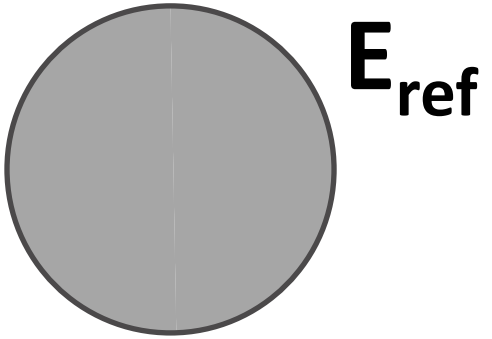


Fig. 71. — Photomètre de Foucault.

Visual equilalization



Photometer

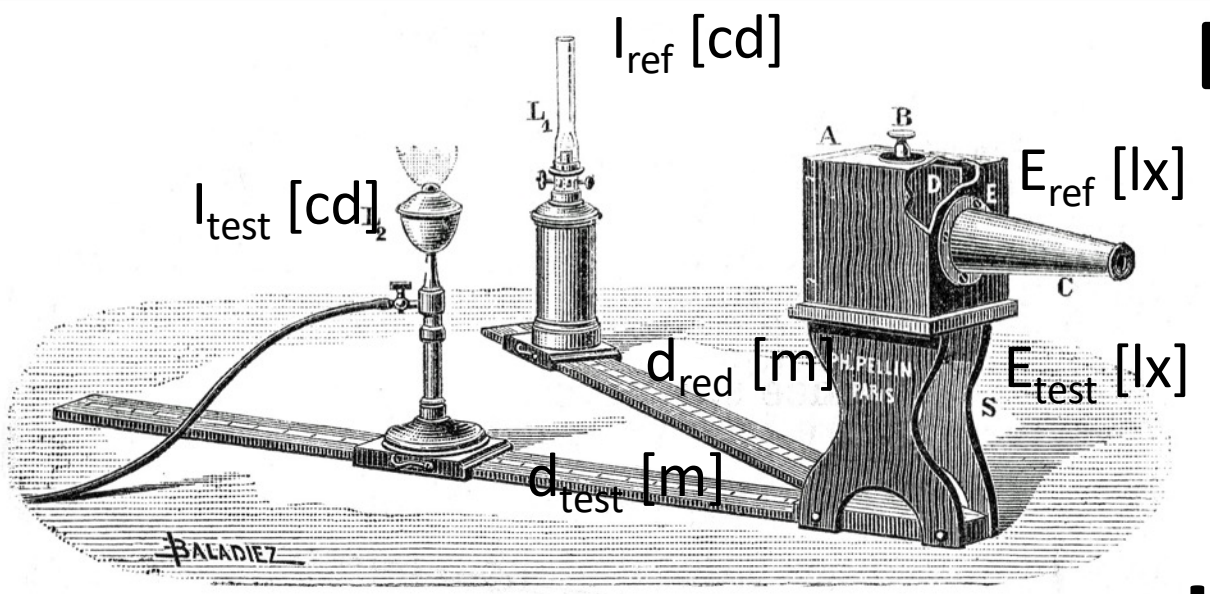
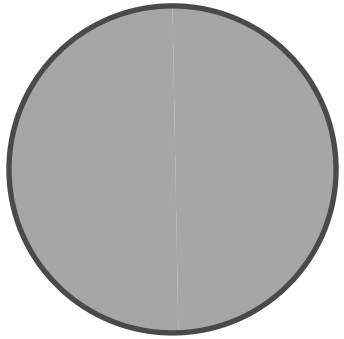


Fig. 71. — Photomètre de Foucault.

Visual equilalization



$$I_{test} = \frac{d_{test}^2}{d_{ref}^2} I_{test}$$

What is the reference ?

I_{ref} [cd]

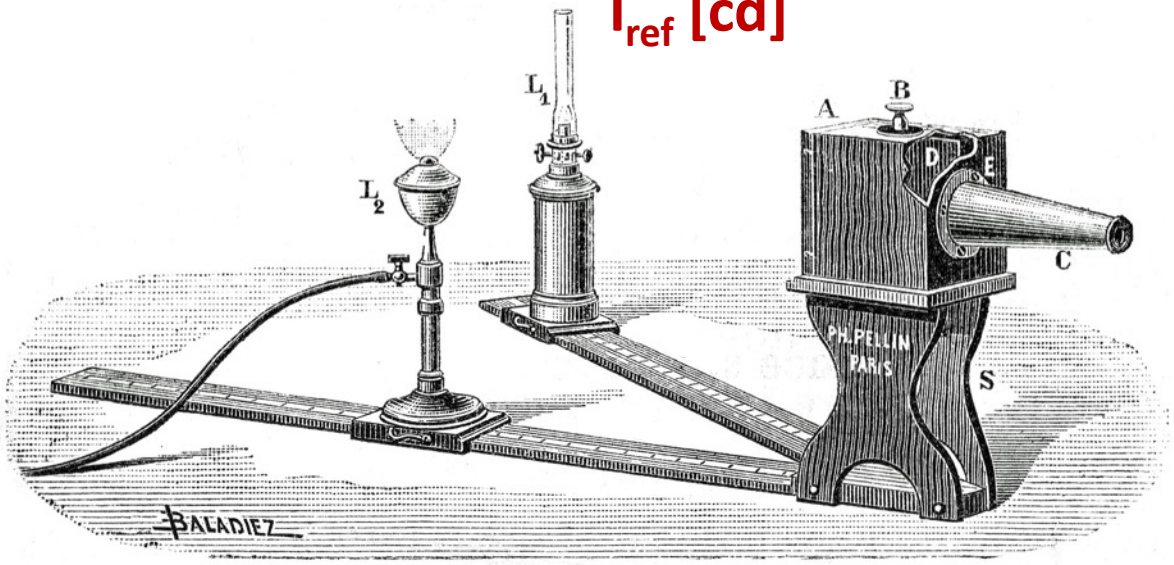
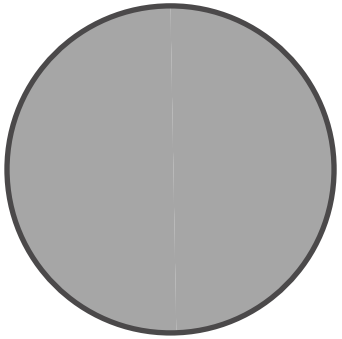


Fig. 71. — Photomètre de Foucault.

Visual equilalization



$$I_{test} = \frac{d_{test}^2}{d_{ref}^2} I_{test}$$

What is the reference ?

Visual equilalization

Standard candle

© Cnam - Musée

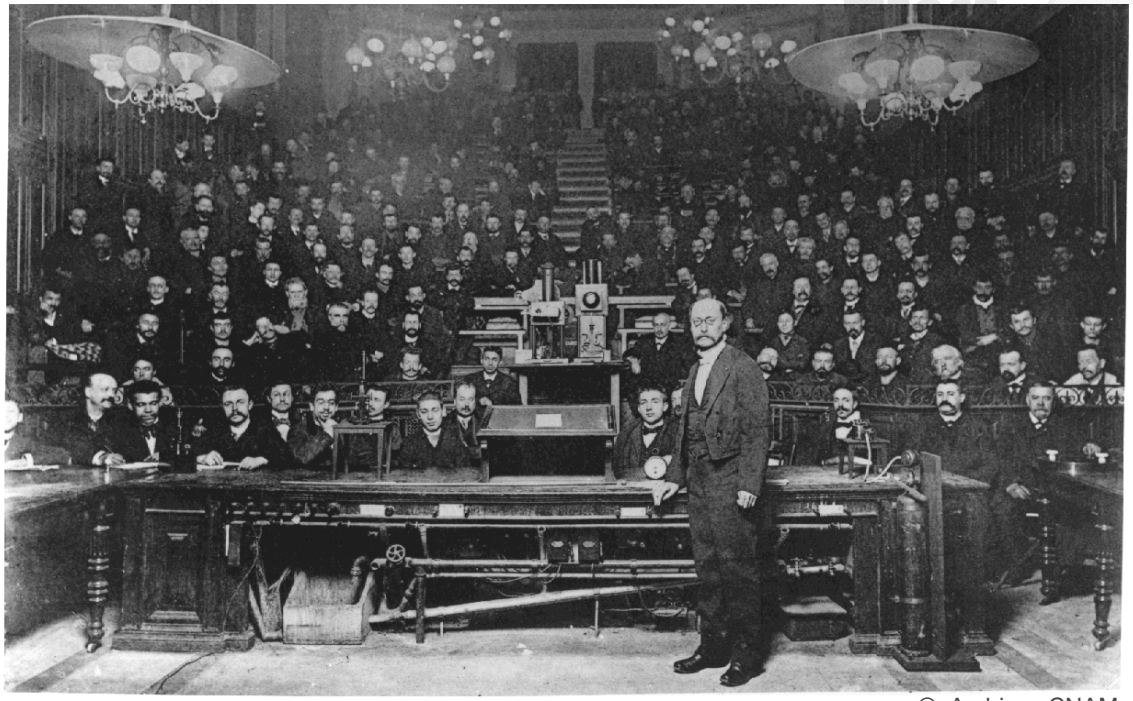
© PTB

© NIST

1880

What is the reference ?

Bougie décimale



© Archives CNAM

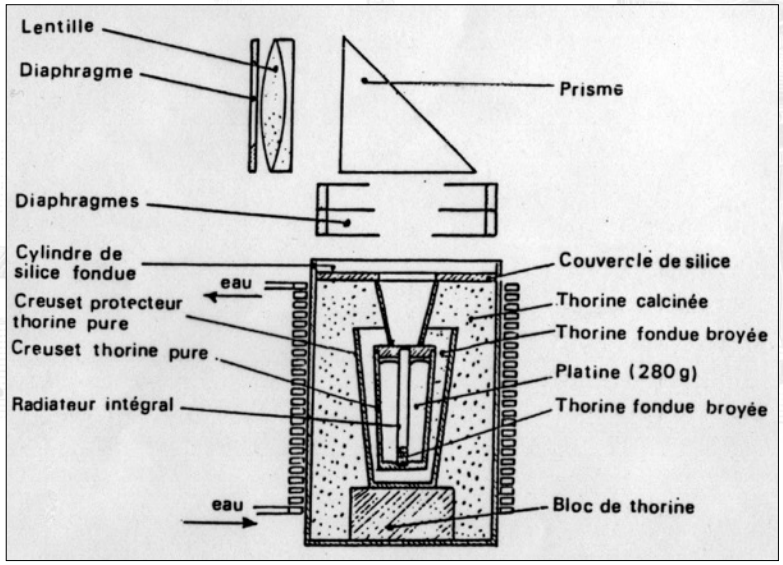
1889

1/20 of the amount of light emitted by 1 cm² of platinium at its freezing temperature

What is the reference ?

Visual equilalization

New candle



Debure M. et Leroy N. - Revue d'optique théorique et instrumentale *31*, 12 (1952)

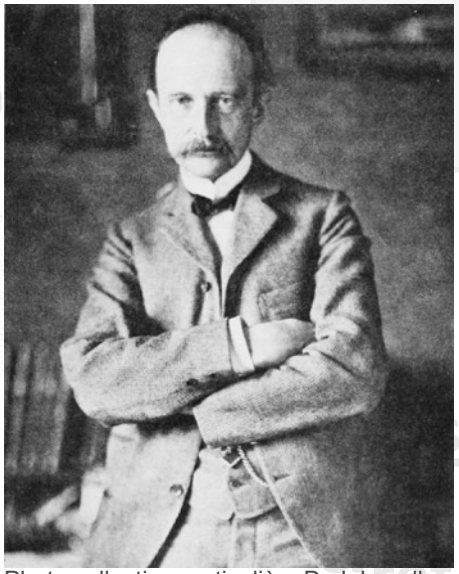


Photo collection particulière D. J. Lovell

1946

1/60 of the brightness of 1 cm^2 of the full radiator at the temperature of solidification of platinium

Photometer

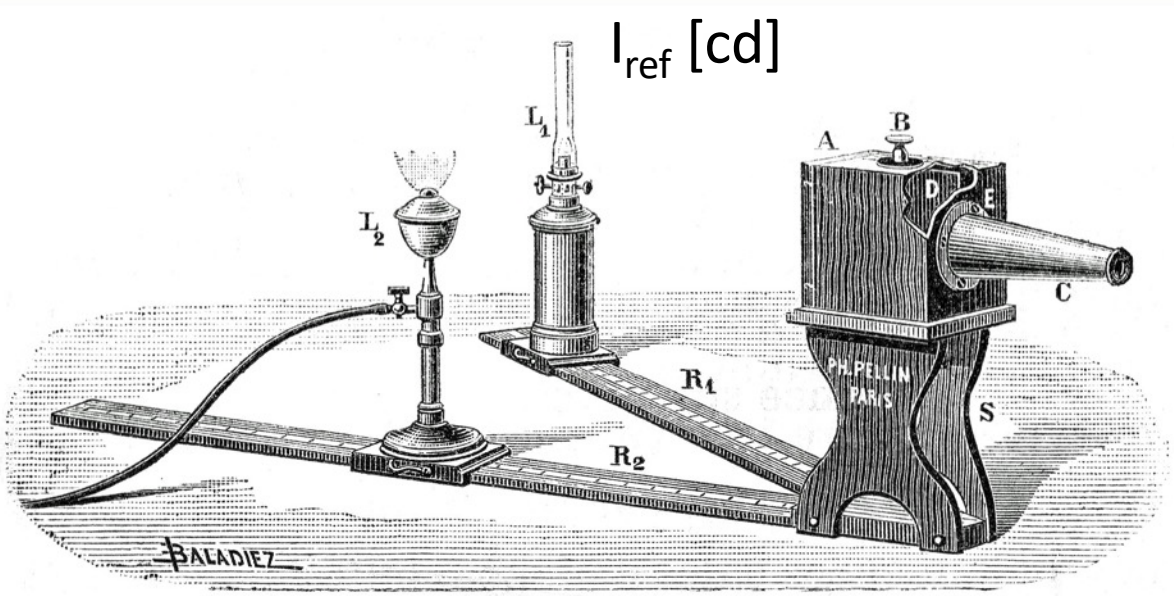
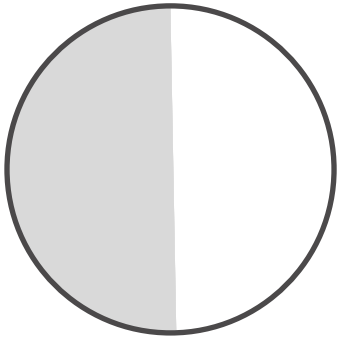


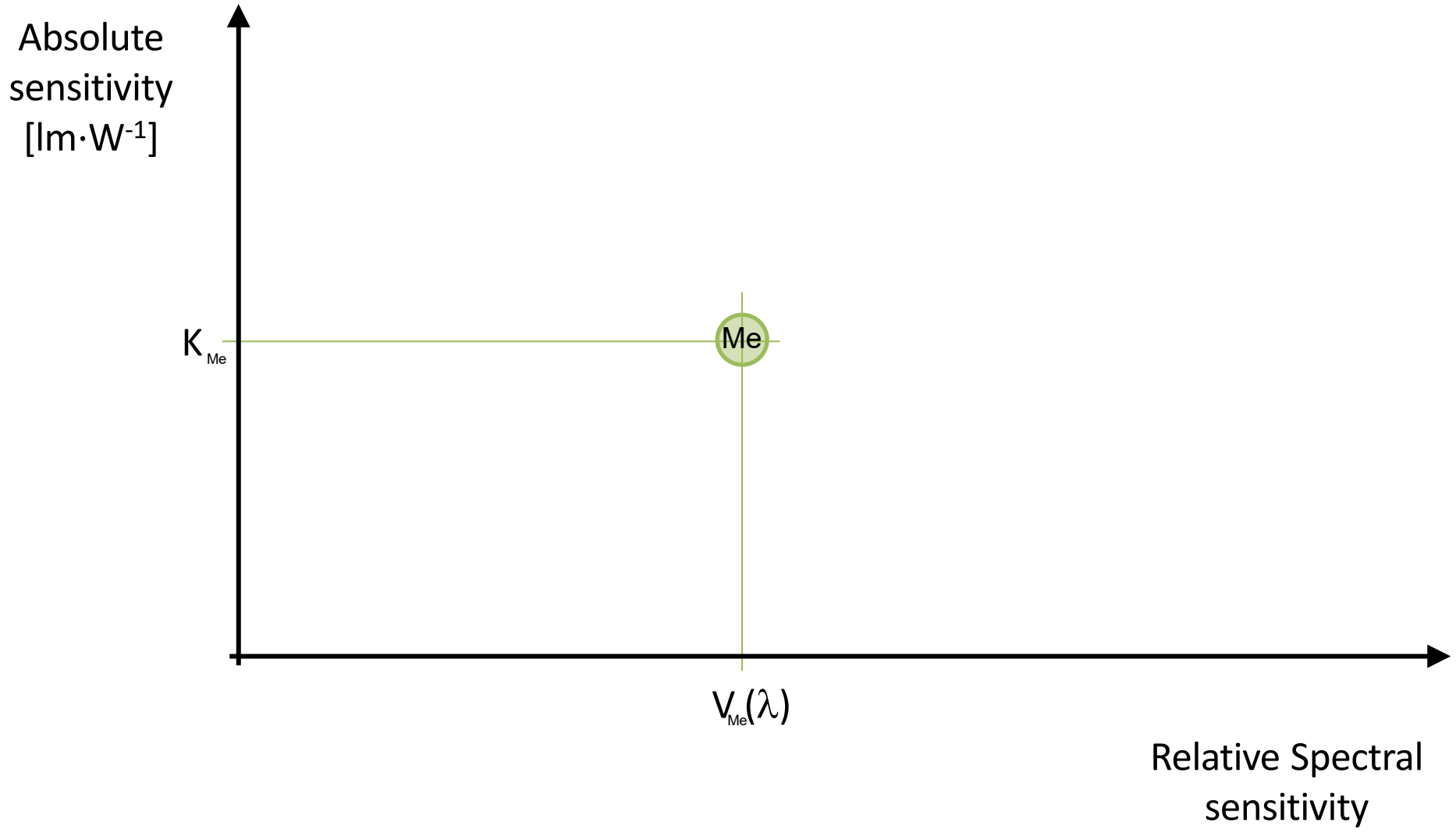
Fig. 71. — Photomètre de Foucault.



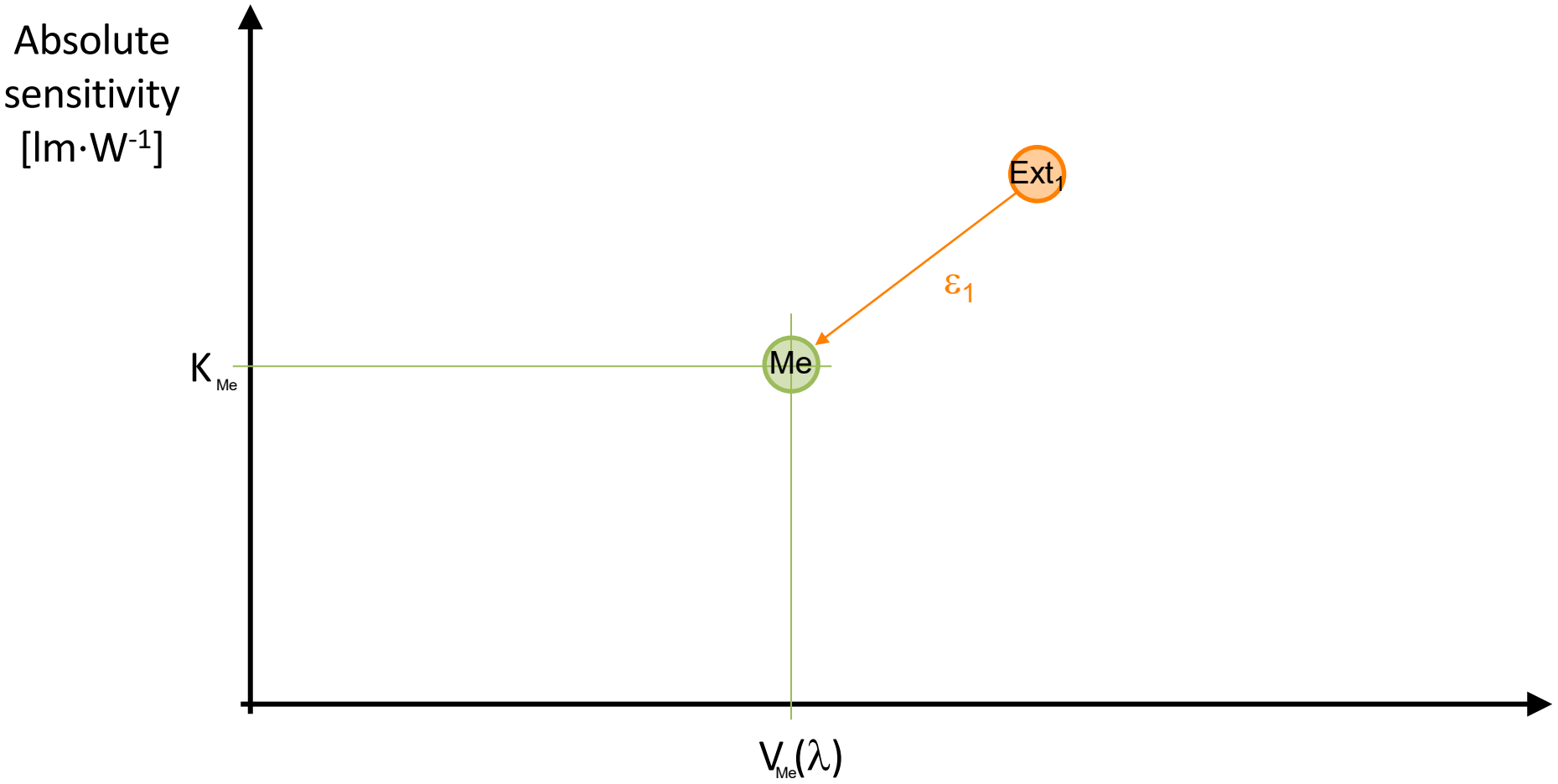
$$I_{test} = \frac{d_{test}^2}{d_{ref}^2} I_{test}$$

The photometer provides a good measurement because it is **my luminous intensity**

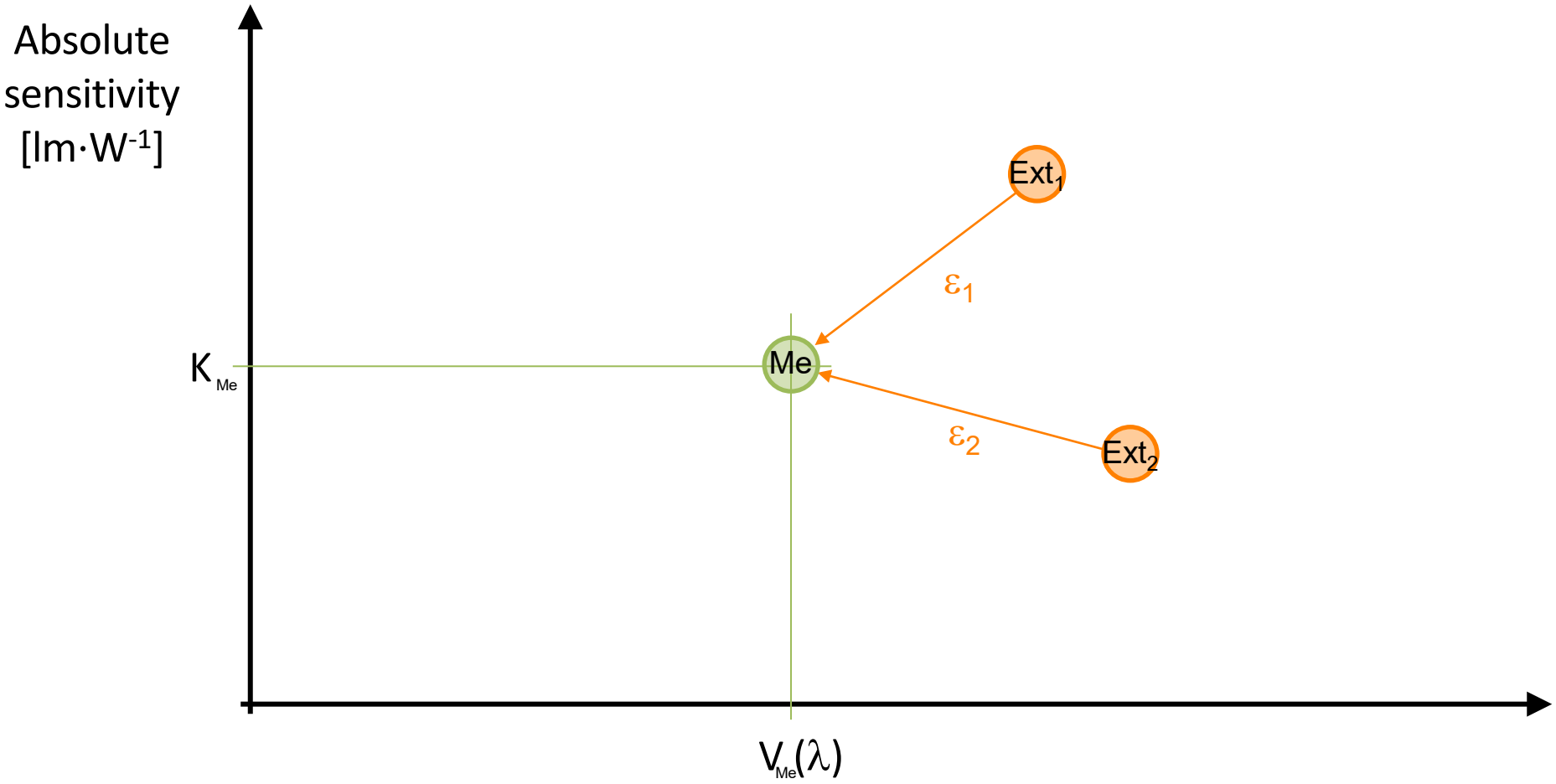
My luminous intensity



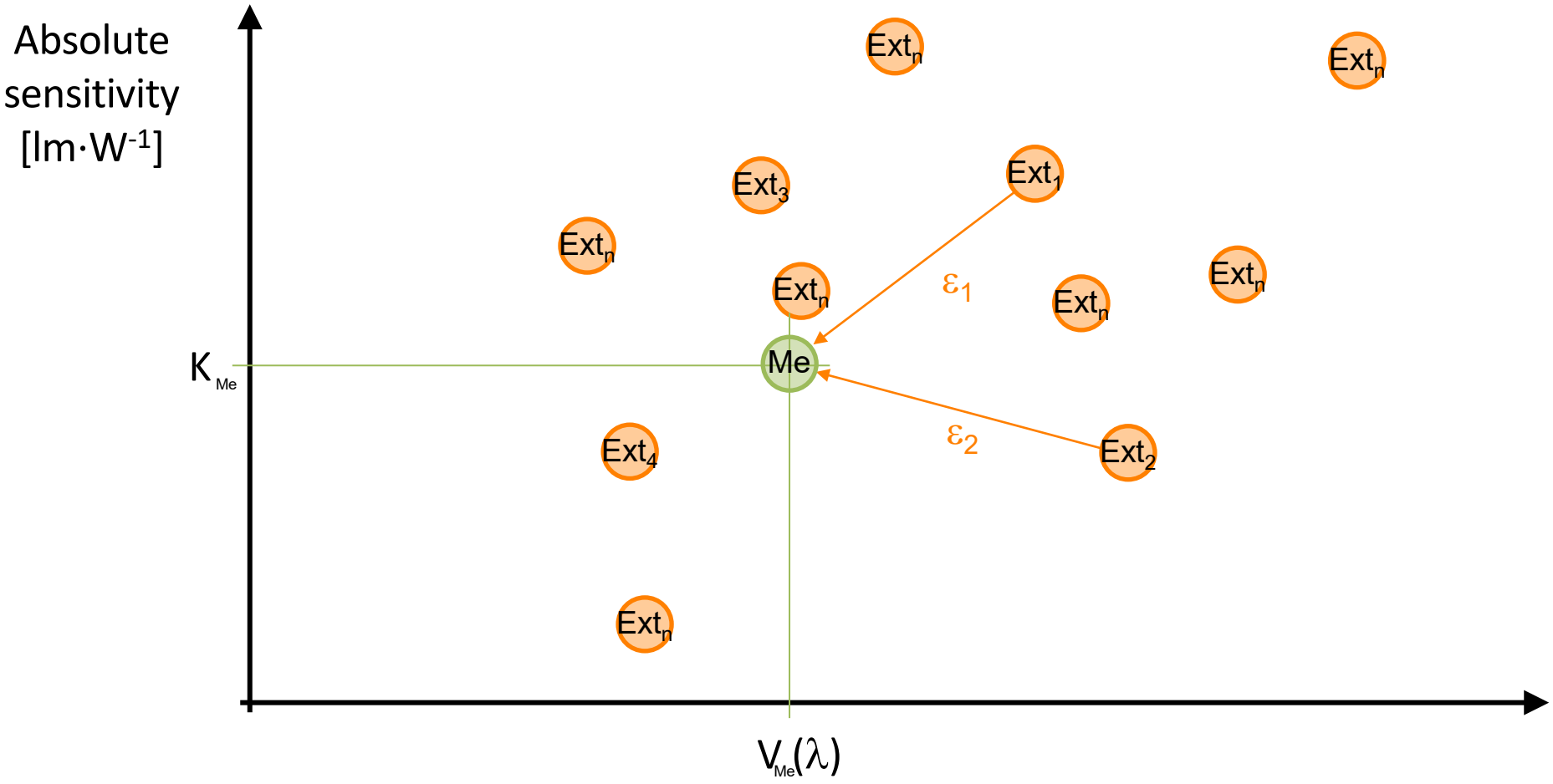
External calibration



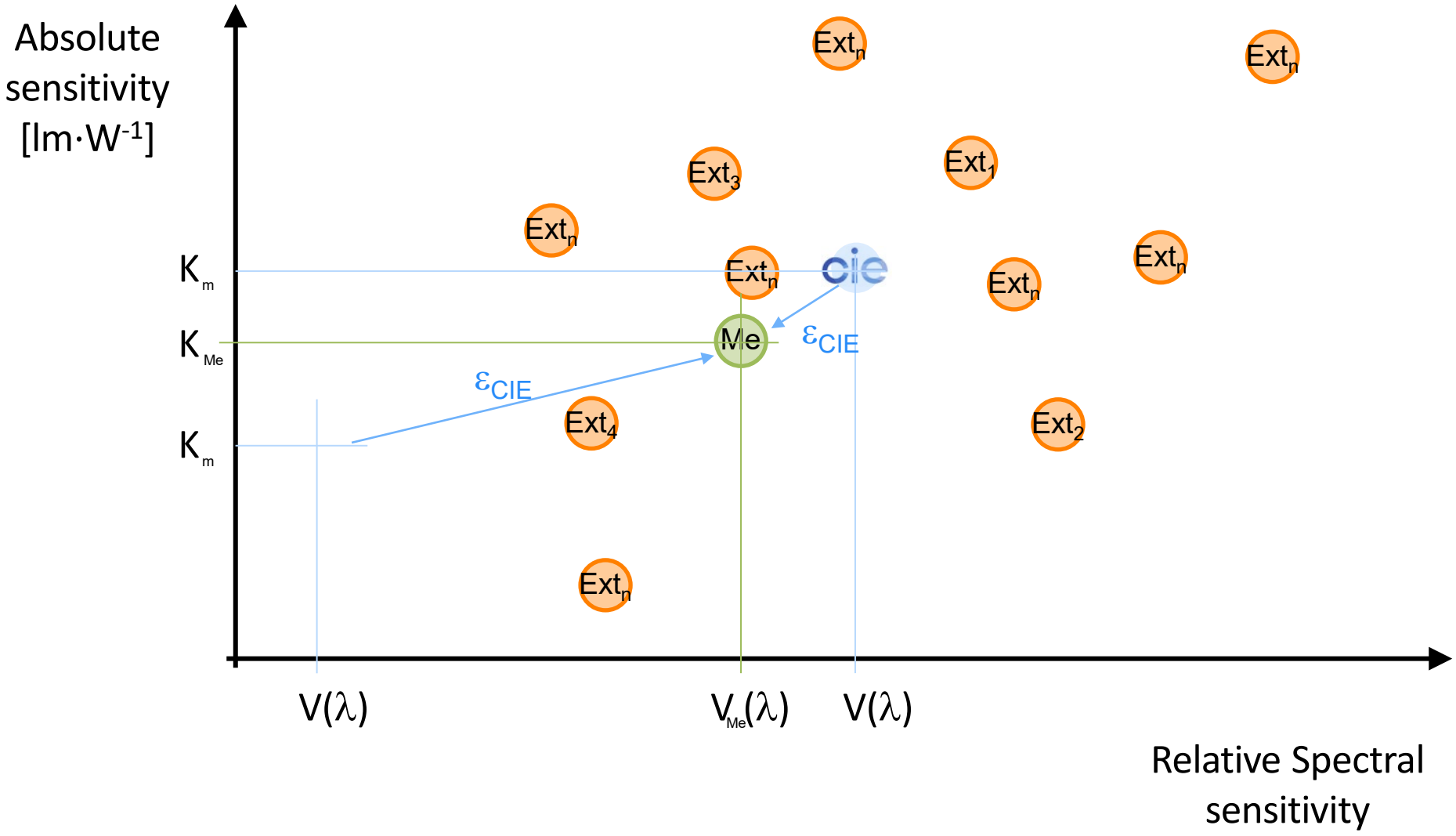
External calibration



External calibrations

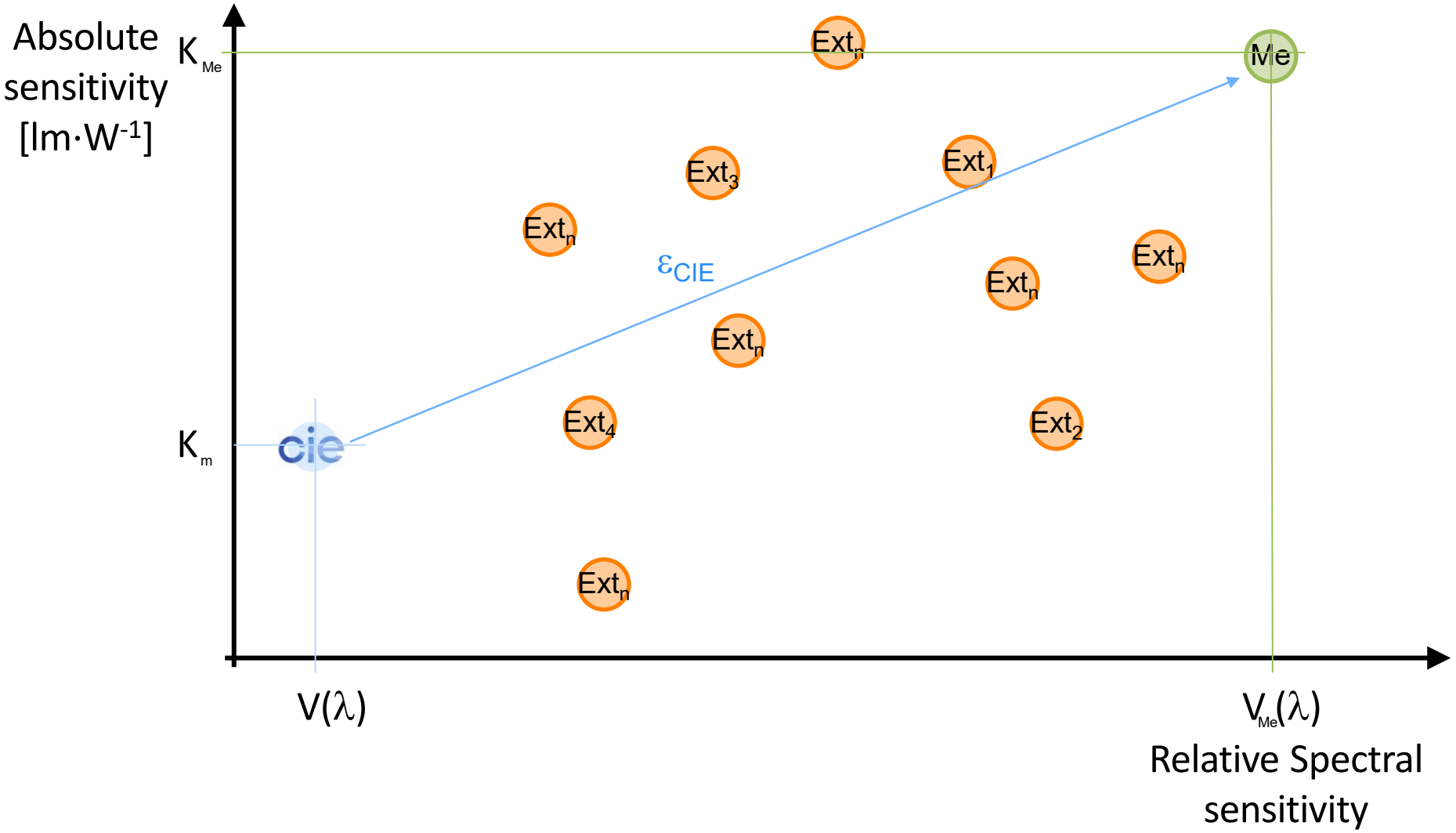


CIE Observer



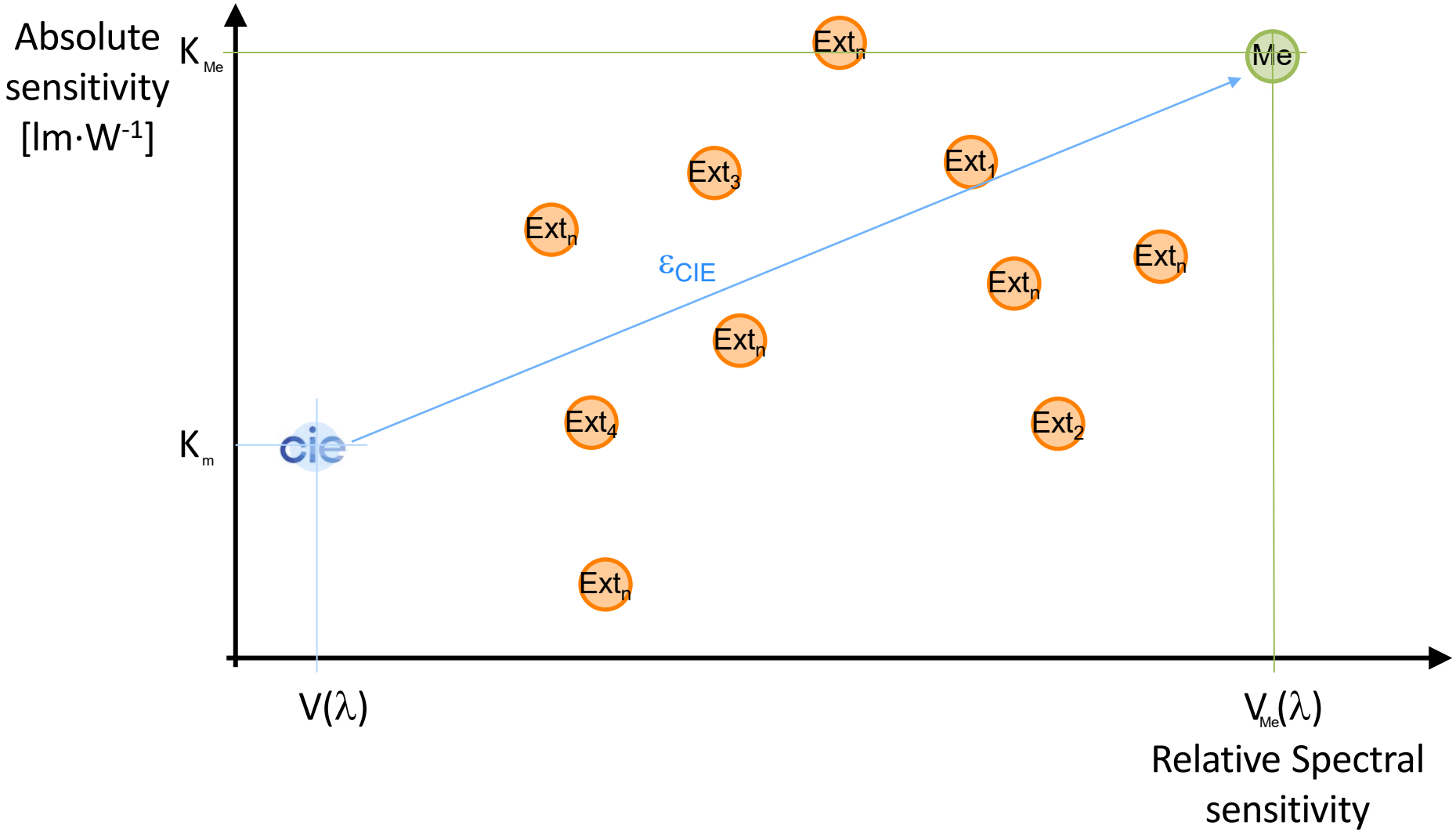
Gab between Me and Standard observer

(× 20 typical uncertainty on realization of the candela)



Who should close the gap ?

Is it the metrology? Is it the user?



Who should close the gap ?

Is it the metrology? Is it the user?

If our answer is that it's the user :

Then at least, the minimum would be to put the standard observer at a better middle of the population, to minimize the effort for users

If our answer is that it's the metrology :

Then we need to provide to each user a frame to get access to an individual measurement

Intermediate solution can be thought (according to region, age, diagnostics)

Personally, even if I don't know exactly how to go about it today, I think it's up to us to organise things to reduce the gap, because I can't be satisfied with a measure that doesn't achieve its objective by more than 20 times the quality of its implementation.

The candela would be defined by taking the fixed appropriate numerical value of the luminous efficacy of a monochromatic radiation at a frequency of $540 \cdot 10^{12}$ Hz to be K_{cd}, expressed in the unit $lm \cdot W^{-1}$, with the appropriate numerical value chosen according to the individual for whom the measurement is intended.

End

Absolute sensitivity [lm·W-1]
K Me
K m
Ext n
Me
Ext 3
Ext 1
Ext n
εCIE
Ext n
Ext n
Ext n
cie
Ext 4
Ext 2
Ext n
V(λ)
V Me(λ)
Relative Spectral sensitivity

About the candela and the SI

Be out of the SI is not a issue, if we provide a more consistant measurement

7 SI units doesn't mean anything today. Only the Hz is really useful.

If the game is to decide what is fundamental and what is not, I see 3 groups

- υ_e first.
- c, h and e constants are fundamental.
- k, K_{cd} and N_a are at the same level.