Training: Industrially used measurement techniques

- **Main sources of uncertainty (integrating spheres and TIR100-2)**

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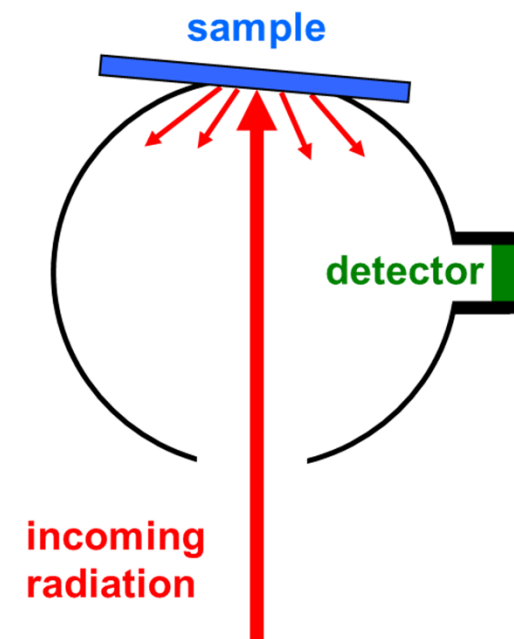**Improvement of emissivity measurements on reflective insulation materials**

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Integrating Sphere

Sources of uncertainty

- calibration standard (specular, diffuse, etc.)

- aperture area

- geometry of the incident beam

- sample position (angle, recess, etc.)

- sample properties, such as
  - crumpled, smooth, …
  - opaque, semi-transparent, …
  - gloss, dullness, …
  - angular depended reflection

- covered wavelength region

TIR100-2

Sources of uncertainty

- calibration standard (high and low emissivity)

- distance between sample and heated device

- massive heat sink behind sample

- pre-heating and measurement time

- sample properties, such as
  - crumpled, smooth, …
  - heat capacity, …
  - specular, diffuse, …
  - multiple reflections

- stability
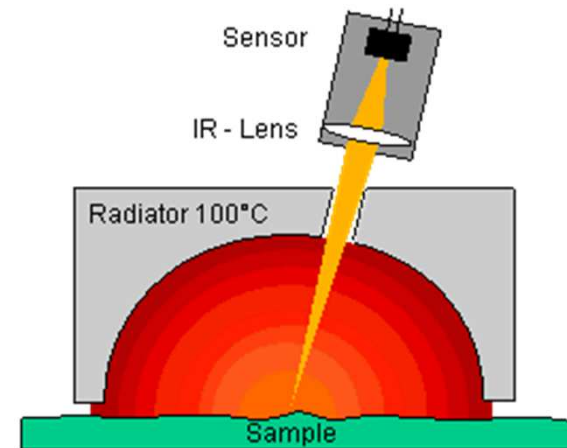
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Thank you!

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Improvement of emissivity measurements on reflective insulation materials

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