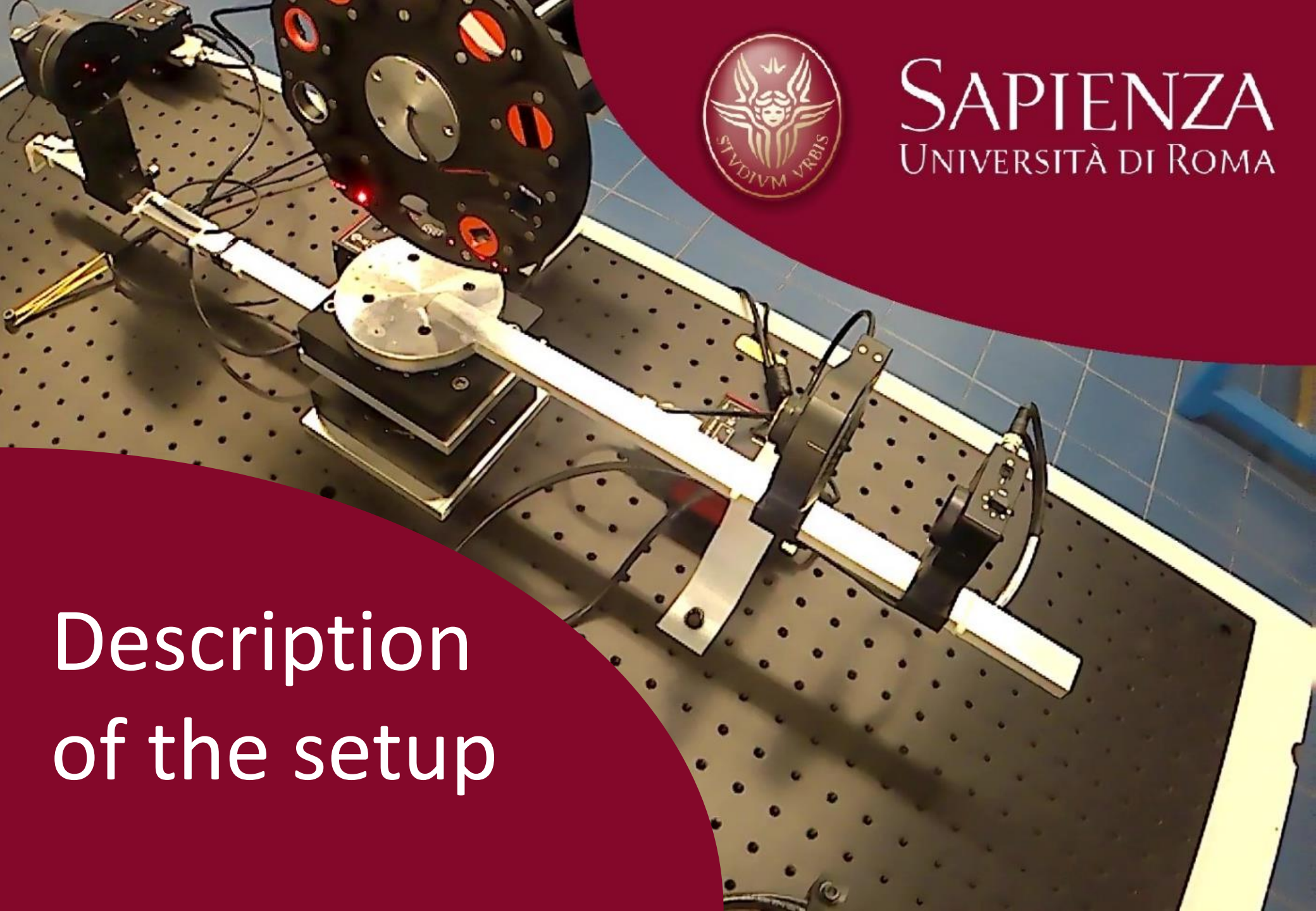
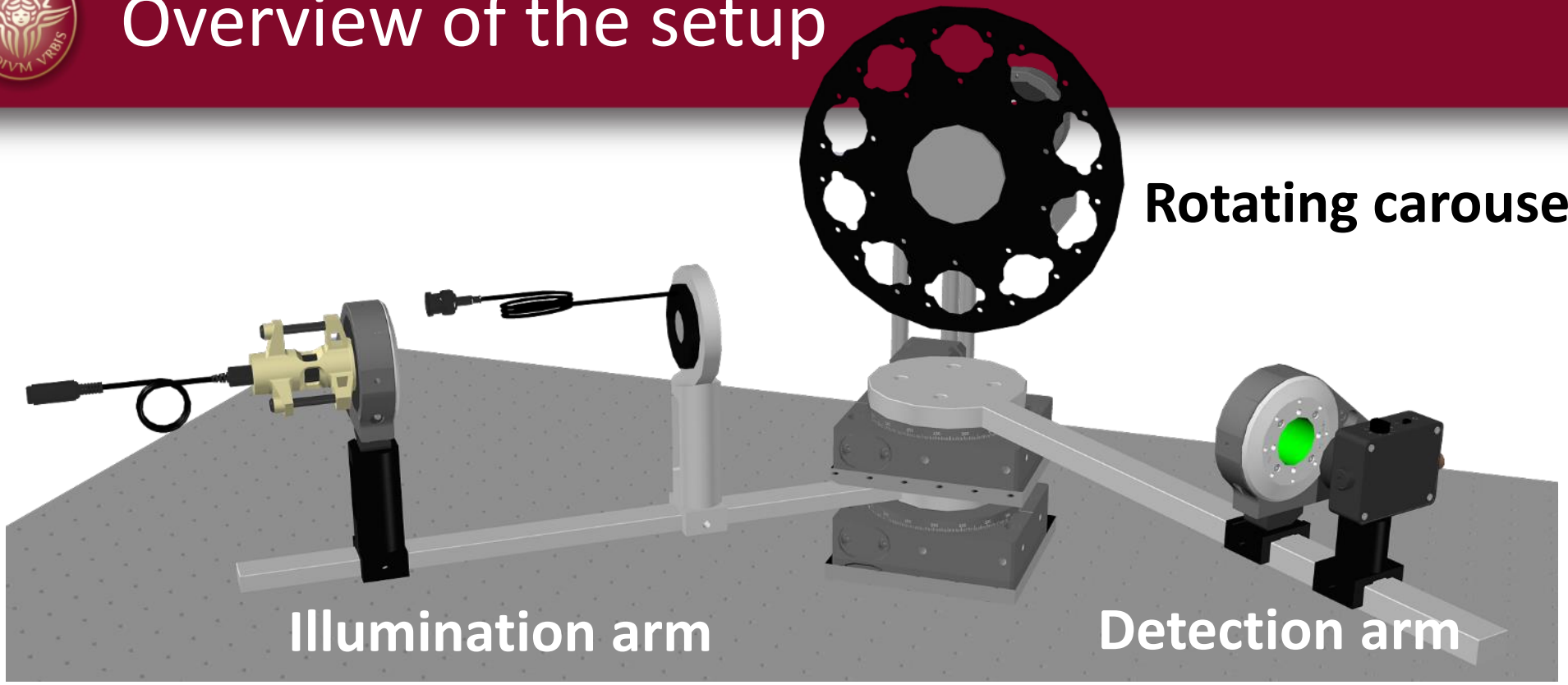


Description of the setup

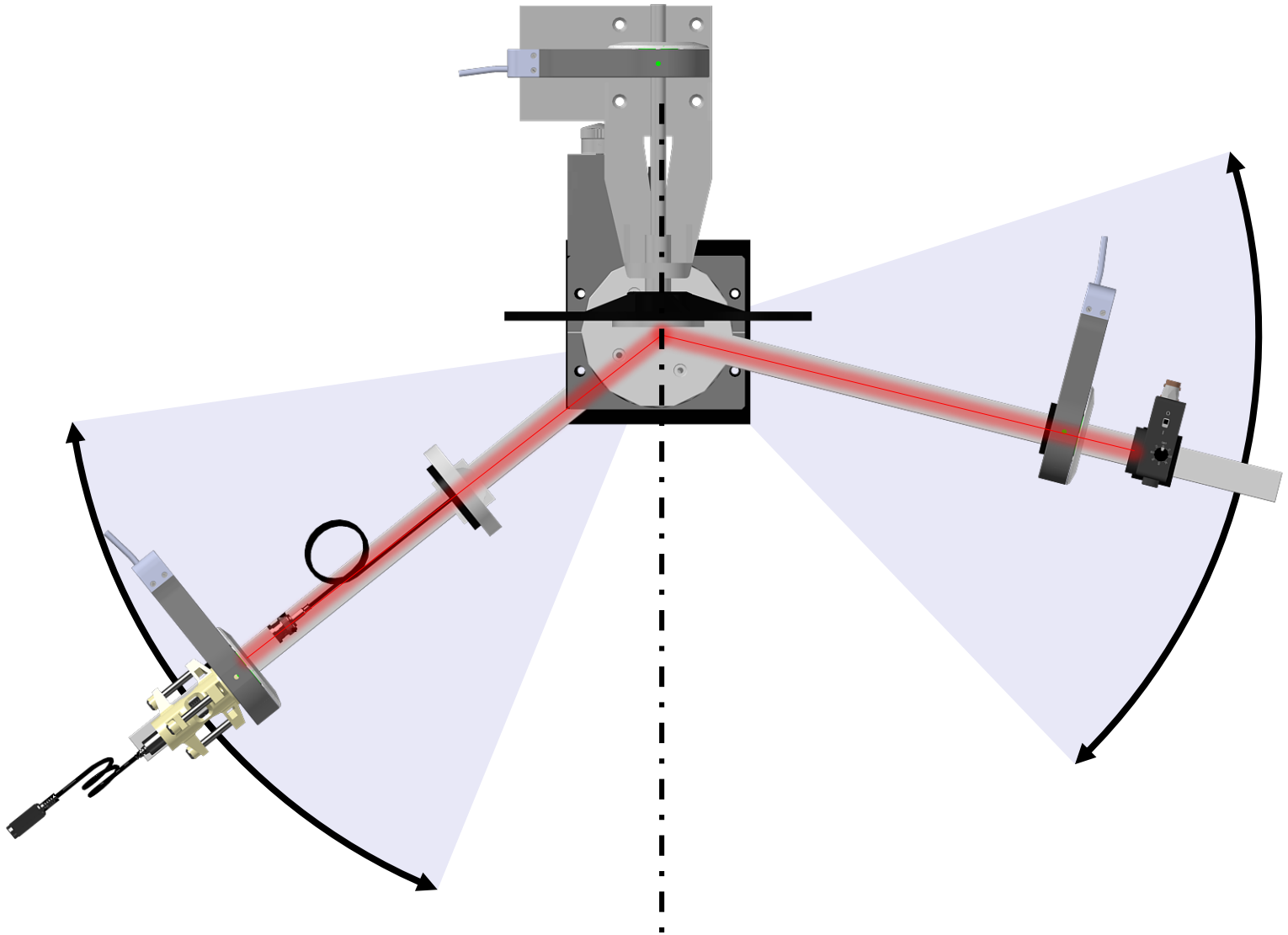
Overview of the setup



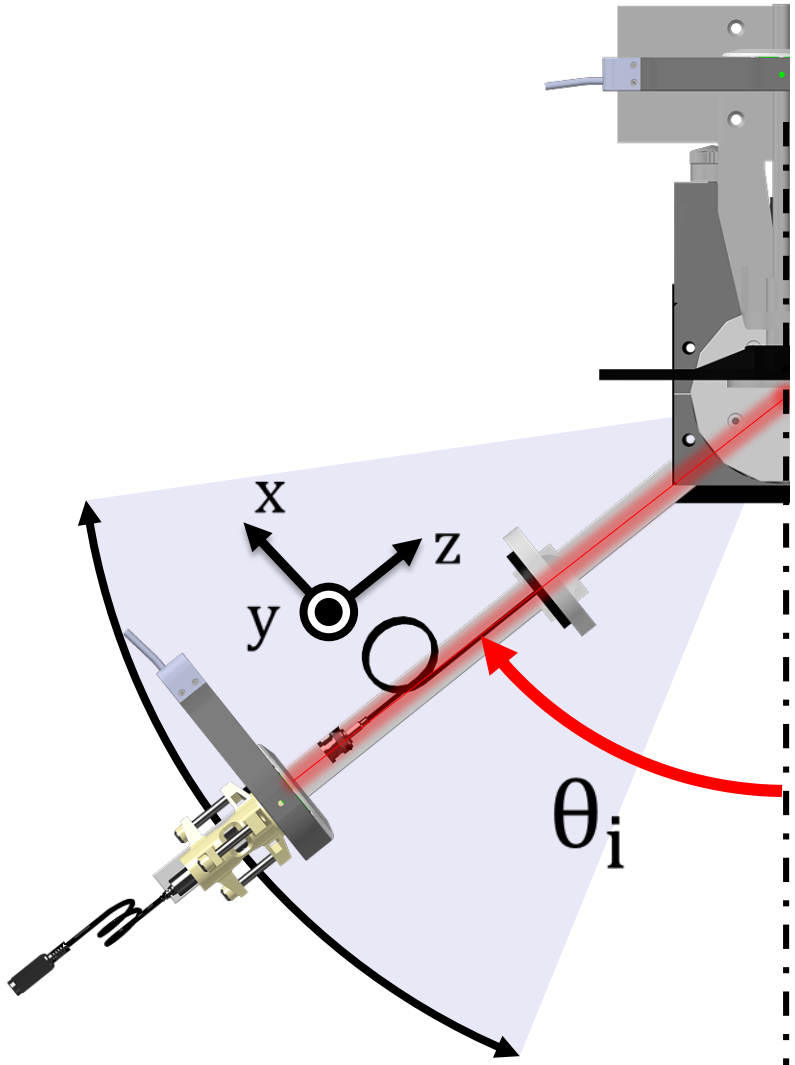
The setup is constituted by:

- An illumination arm mounted on an independent motorized rotary stage;
- A detection arm mounted on an independent motorized rotary stage;
- A rotating carousel with standard samples (not shown). The front facets of the samples are centered to the common axis of the two rotary stages.

Top view of the setup



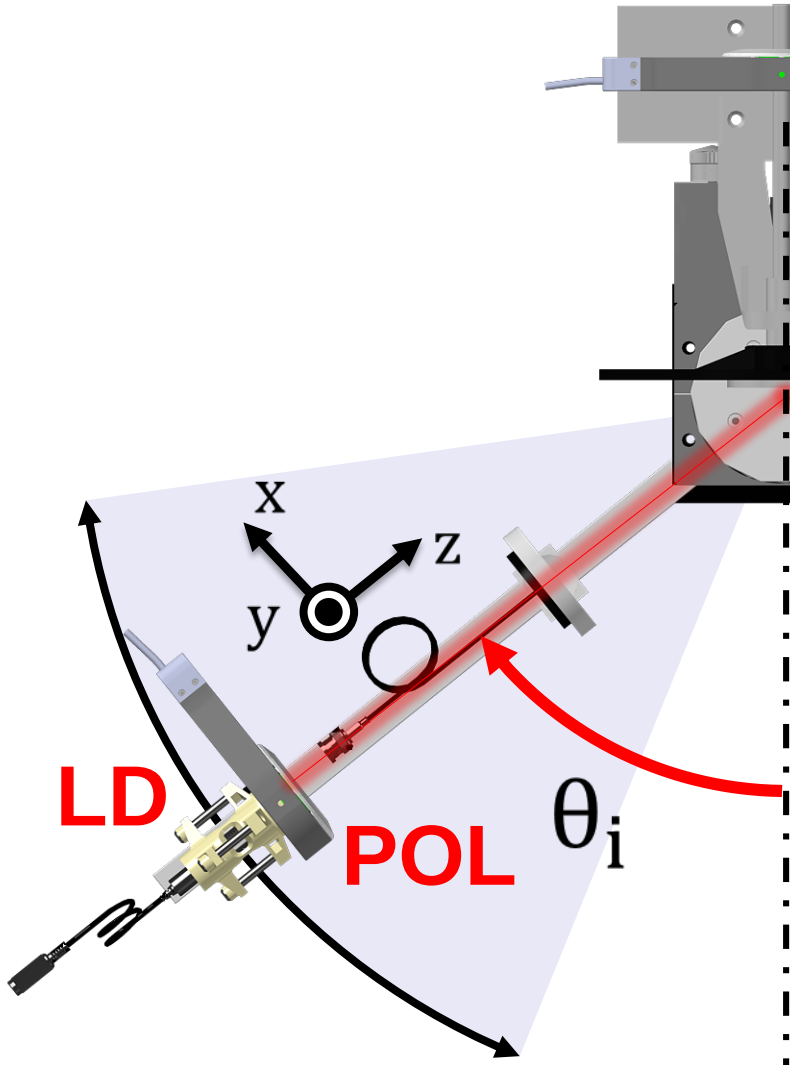
Illumination arm



- The illumination arm angle θ_i can be changed by a stepping motor rotary stage with 0.001° resolution
- The limits of the θ_i range depend on the selected mode of operation
- The xyz reference is used to describe the illumination polarization states:

$x \rightarrow p\ (\pi)$ *polarization*
$y \rightarrow s\ (\sigma)$ *polarization*

Illumination arm



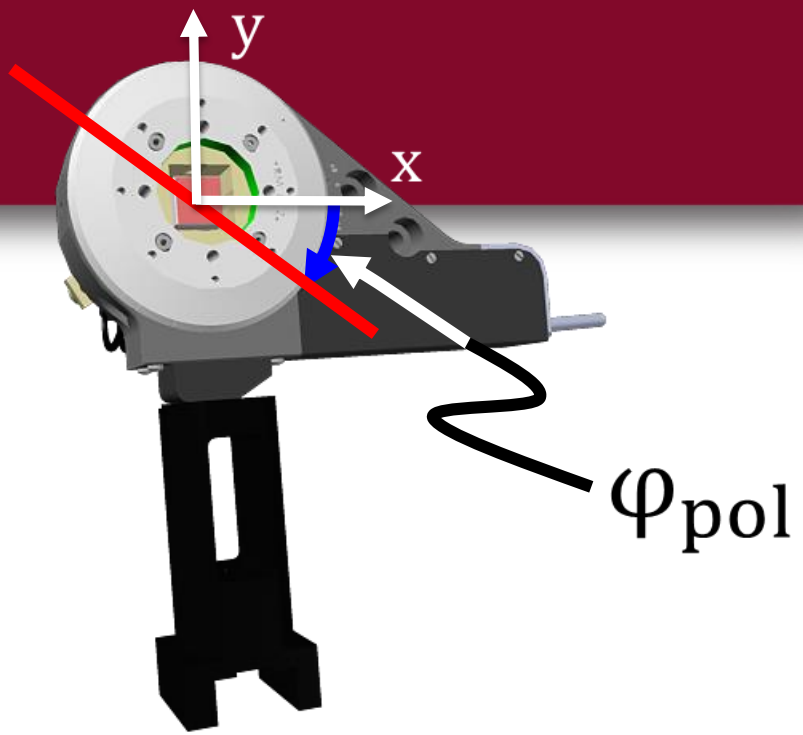
- A polarized CW laser diode (**LD**) is used as illumination source:

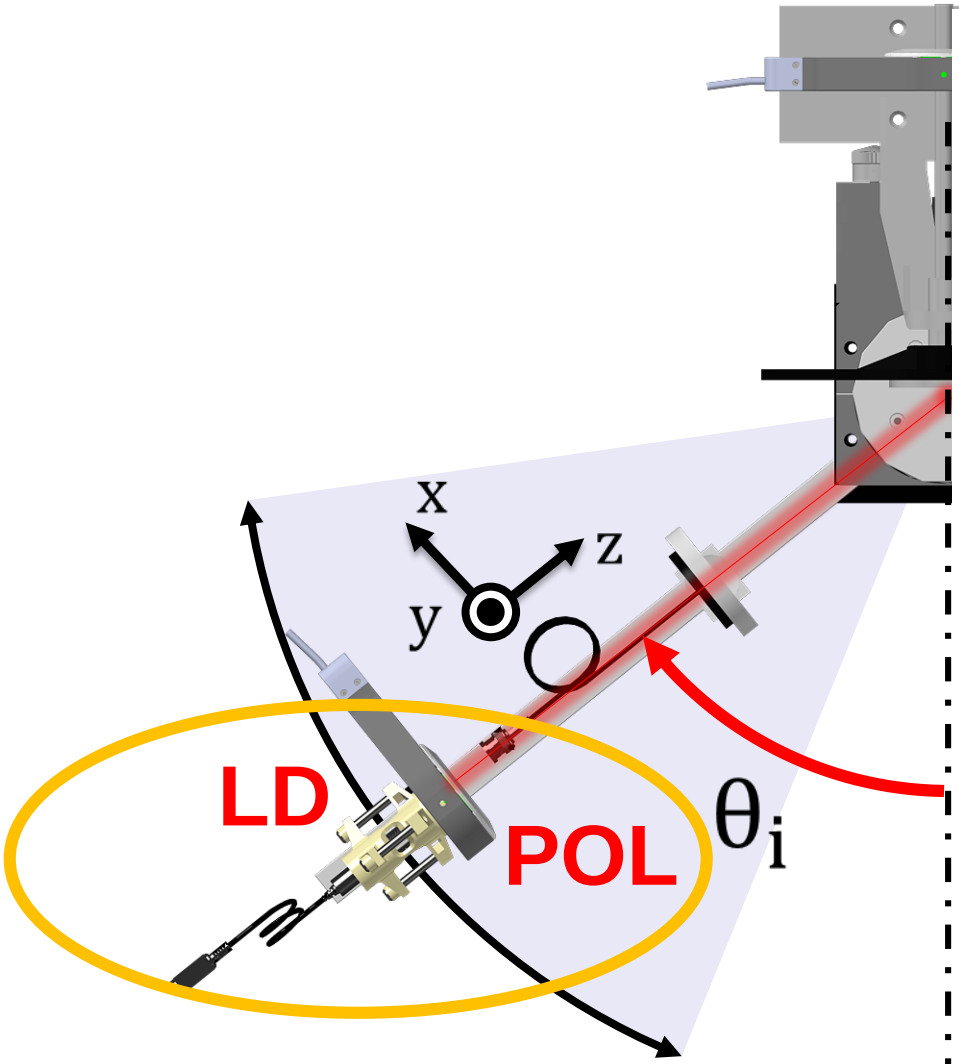
  Wavelenght $\lambda = 637\ nm$
  Power $P = 4.6\ mW$

- A Glan-Taylor polarizer (**POL**) with anti-reflection coating at λ is used to obtain pure linear polarization with an extinction ratio greater than 100000:1

- **LD** and **POL** are aligned and can be rotated together by a motorized rotary stage

Illumination arm



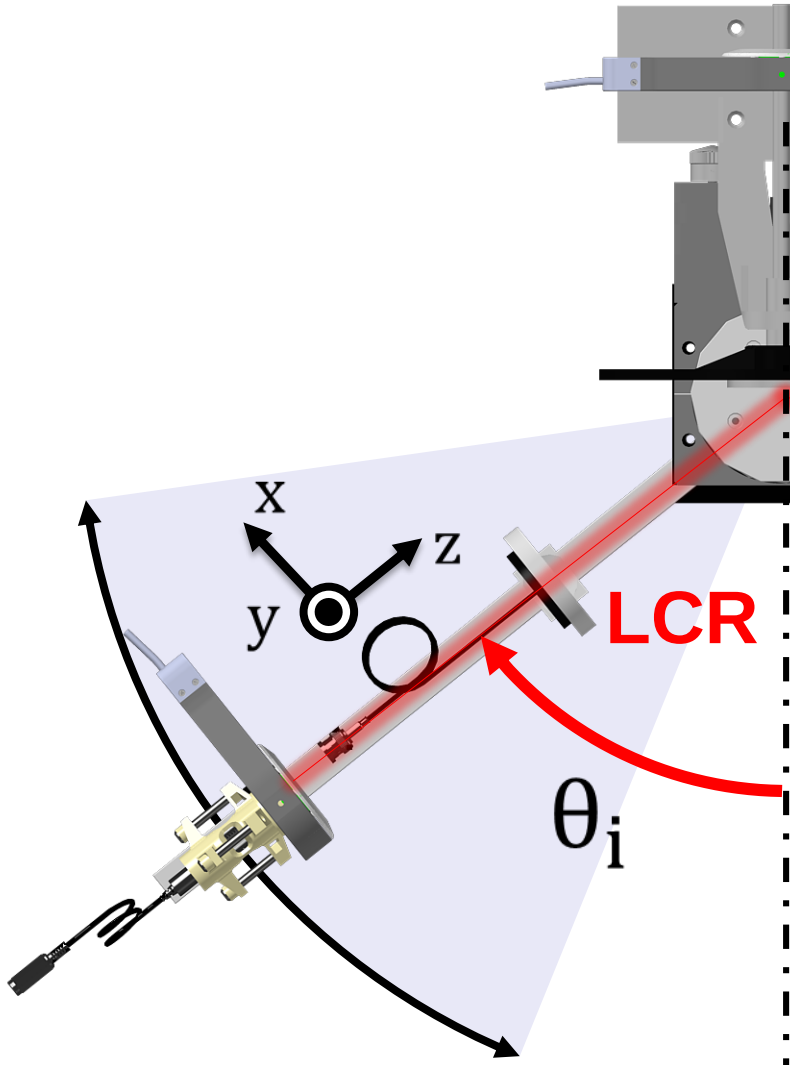


- The linear polarization angle φ_{pol} can be changed in the (0°, -90°) range with 0.001° resolution:

$\varphi_{pol} = 0° \rightarrow$ *p polarization*

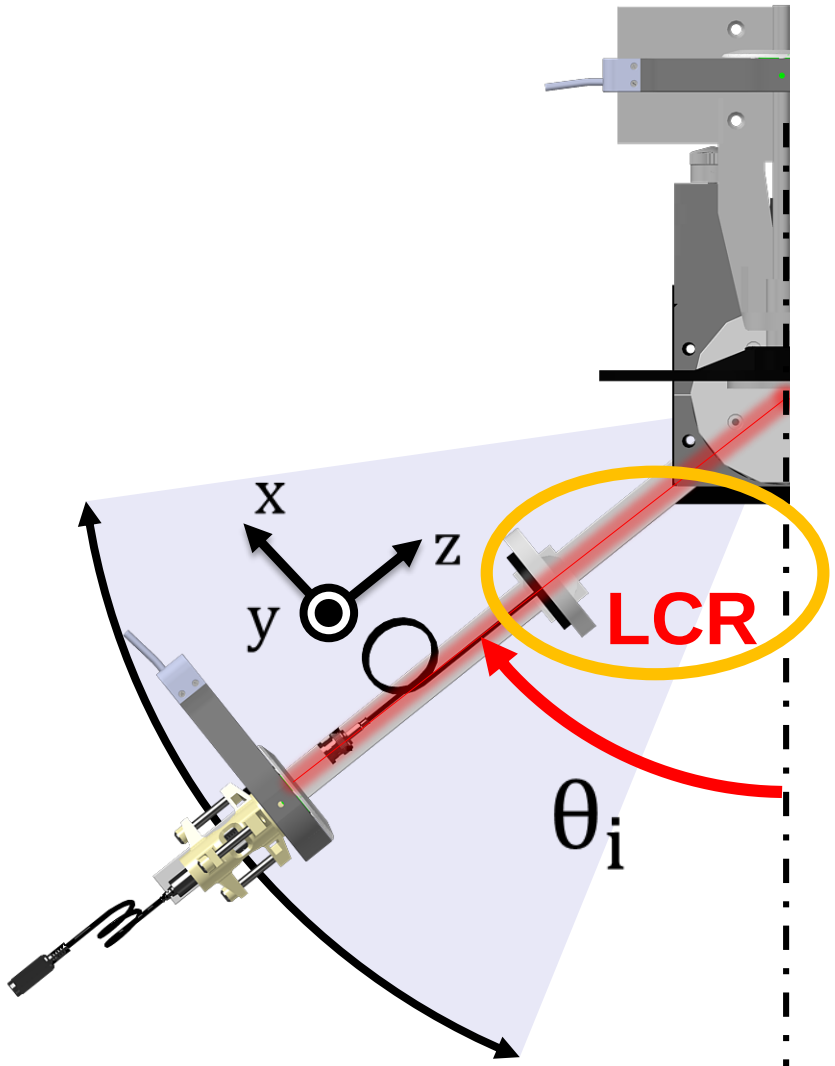
$\varphi_{pol} = -90° \rightarrow$ *s polarization*

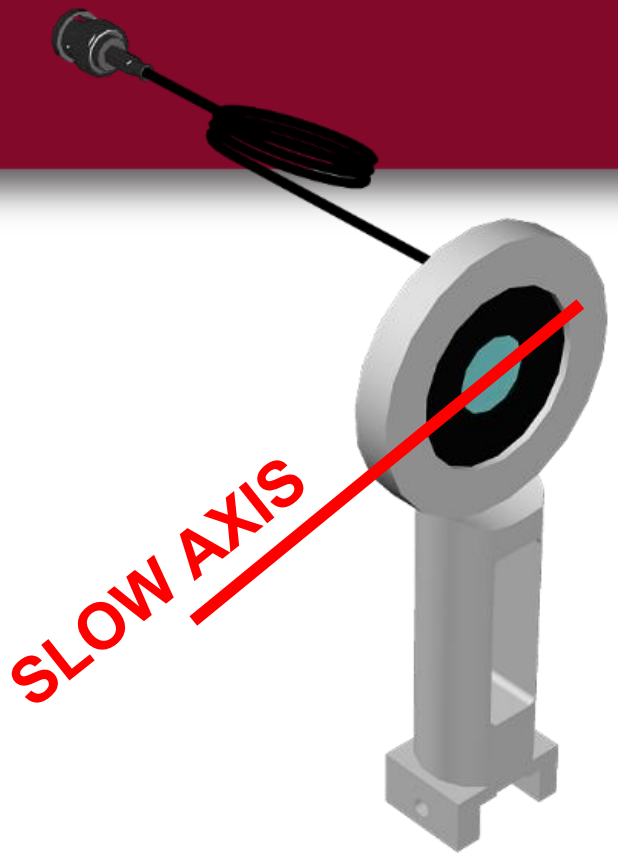
Illumination arm



- A liquid crystal retarder (**LCR**) is used to change the phase Ψ between the s and p polarization components
- The **LCR** slow axis is along x
- The phase Ψ can be changed in the (0°, 360°) range
- Any elliptically polarized state can be obtained at the output of the LCR and before reaching the sample

Illumination arm



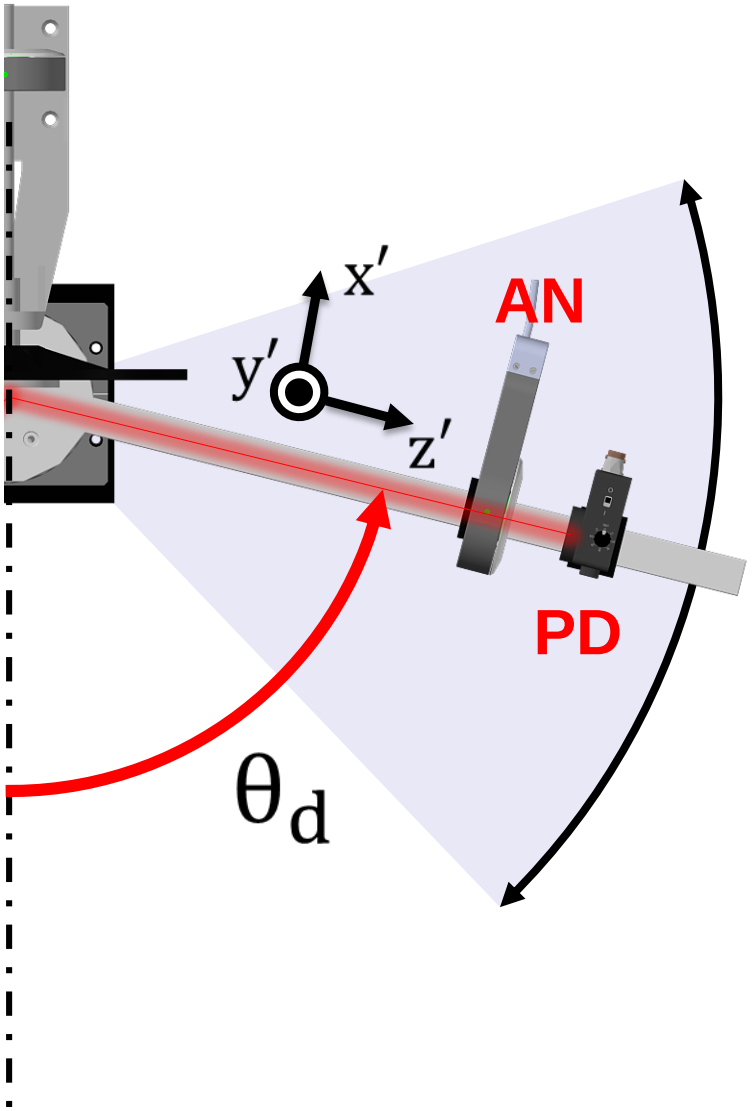


- An app showing the polarization state on the Poincaré sphere of the light before reaching the sample for different values of φ_{pol} and Ψ can be downloaded here

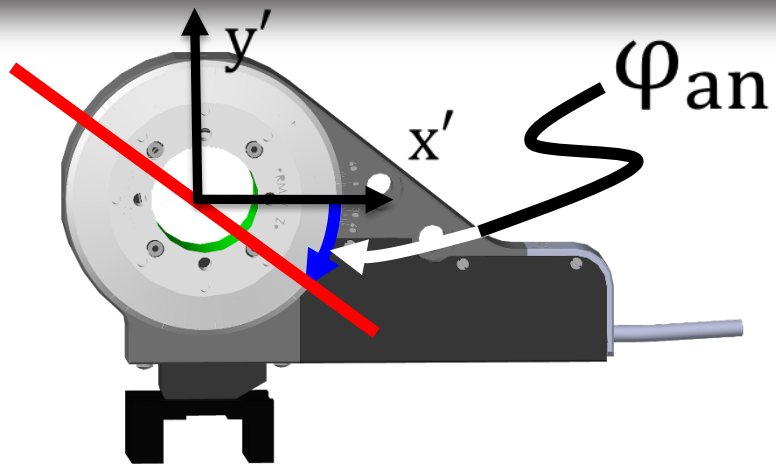
Detection arm

- The detection arm angle θ_d can be changed by a stepping motor rotary stage with 0.001° resolution
- The limits of the θ_d range depend on the selected mode of operation
- The x'y'z' reference is used to describe the illumination polarization states:

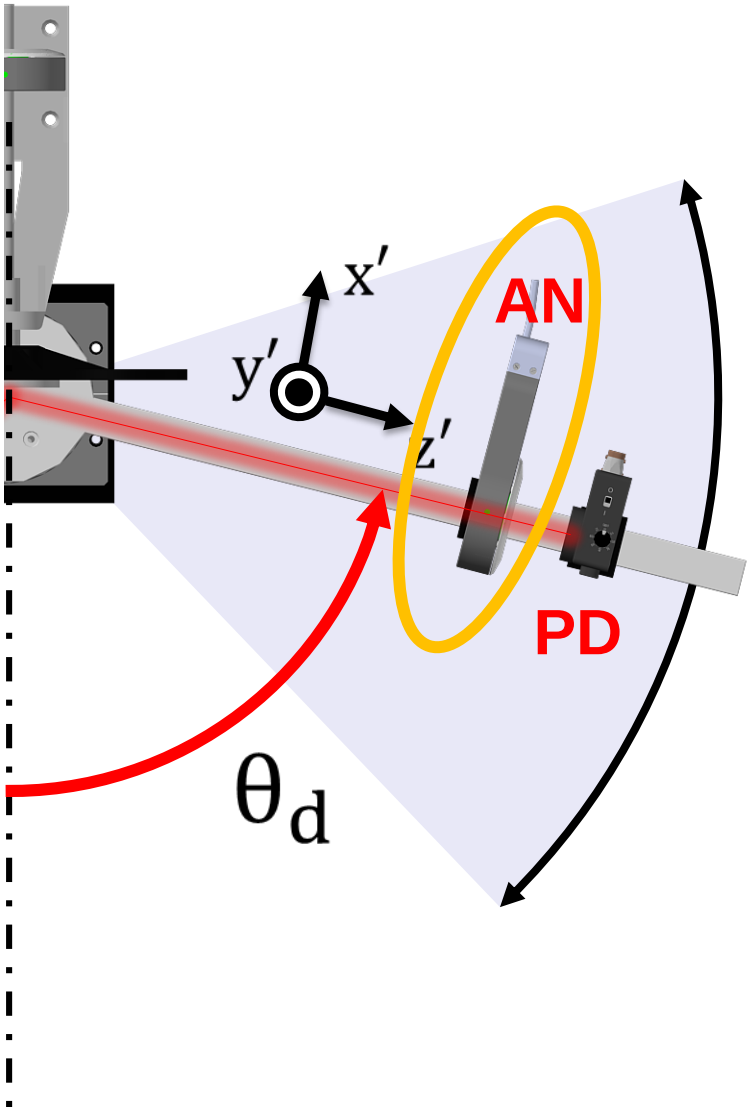
  x' → p (π) polarization
  y' → s (σ) polarization



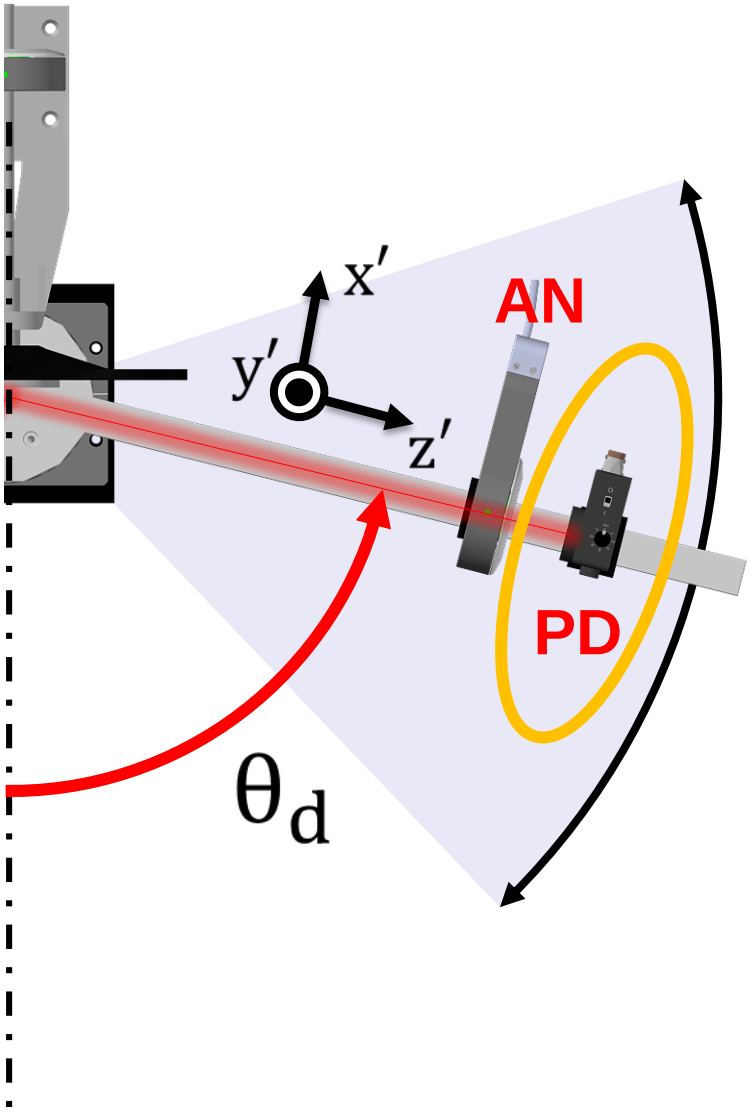
Detection arm



- A Glan-Taylor polarizer (**AN**) with AR coating at λ is used to analyze the state of polarization of light (ER> 100000:1)
- The linear polarization angle φ_{an} can be changed in the (0°, 360°) range with 0.001° resolution



Detection arm

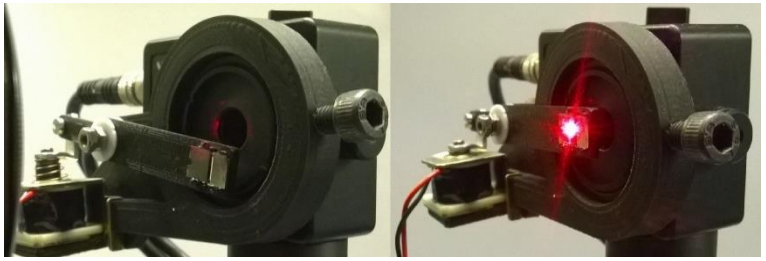


- An amplified silicon photodiode (**PD**) is used as a detector:

Sensitivity	*0.95V/mW*
Diameter	*8.5 mm*
θ_d field of view	*1.48°*

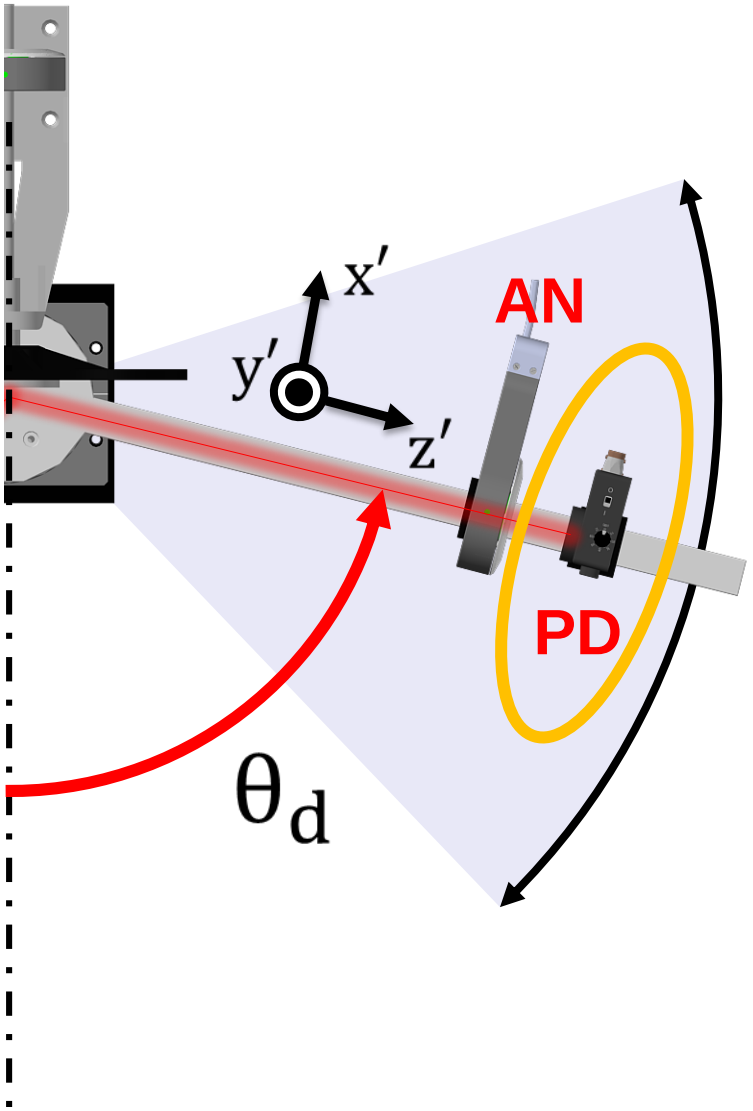
- **PD** is sampled by means of an AD converter with 10-bit resolution and 5V bias

Detection arm

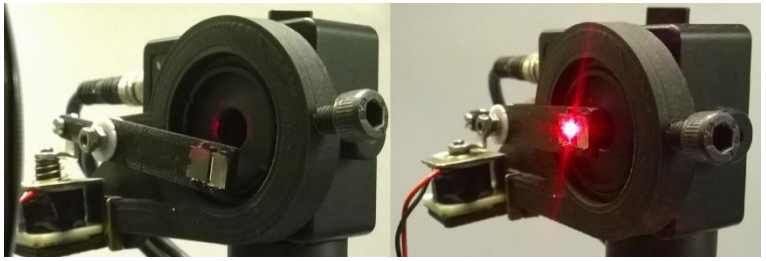


1.47° **0.17°**

- When operating in the scattering mode the field of view is reduced to 0.17° by means of an electrically controlled custom shutter
- Moreover, when operating in the scattering mode and with the slit as sample the AD converter is biased at 1.106V



Detection arm



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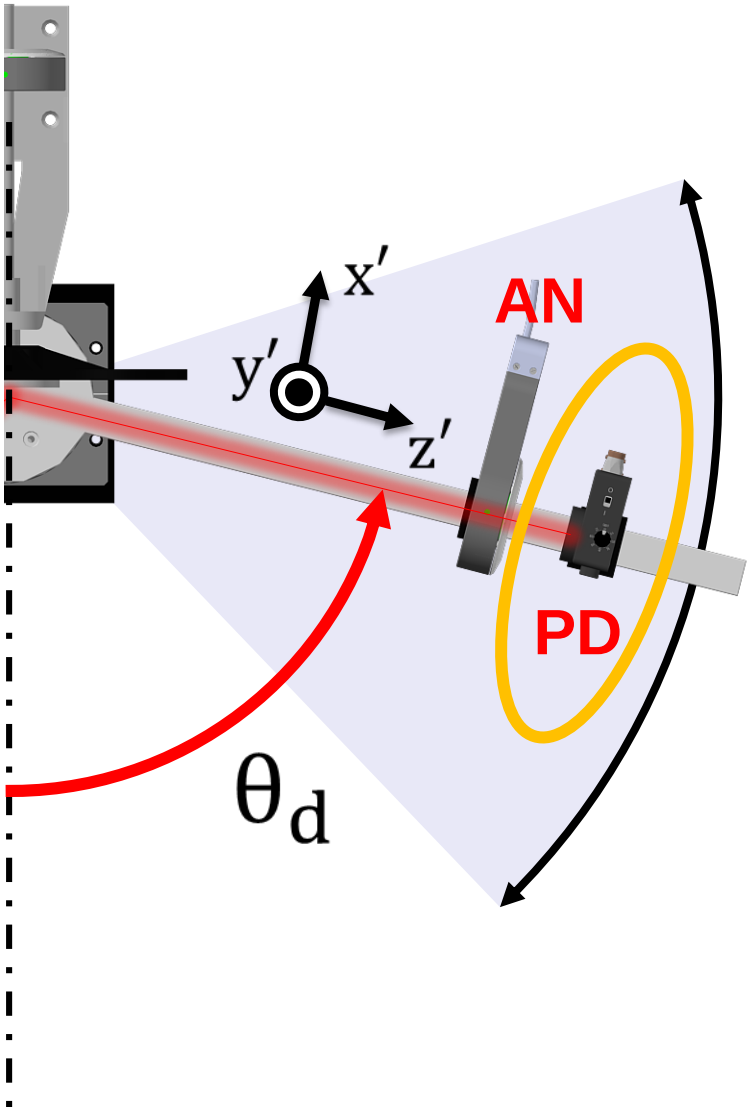
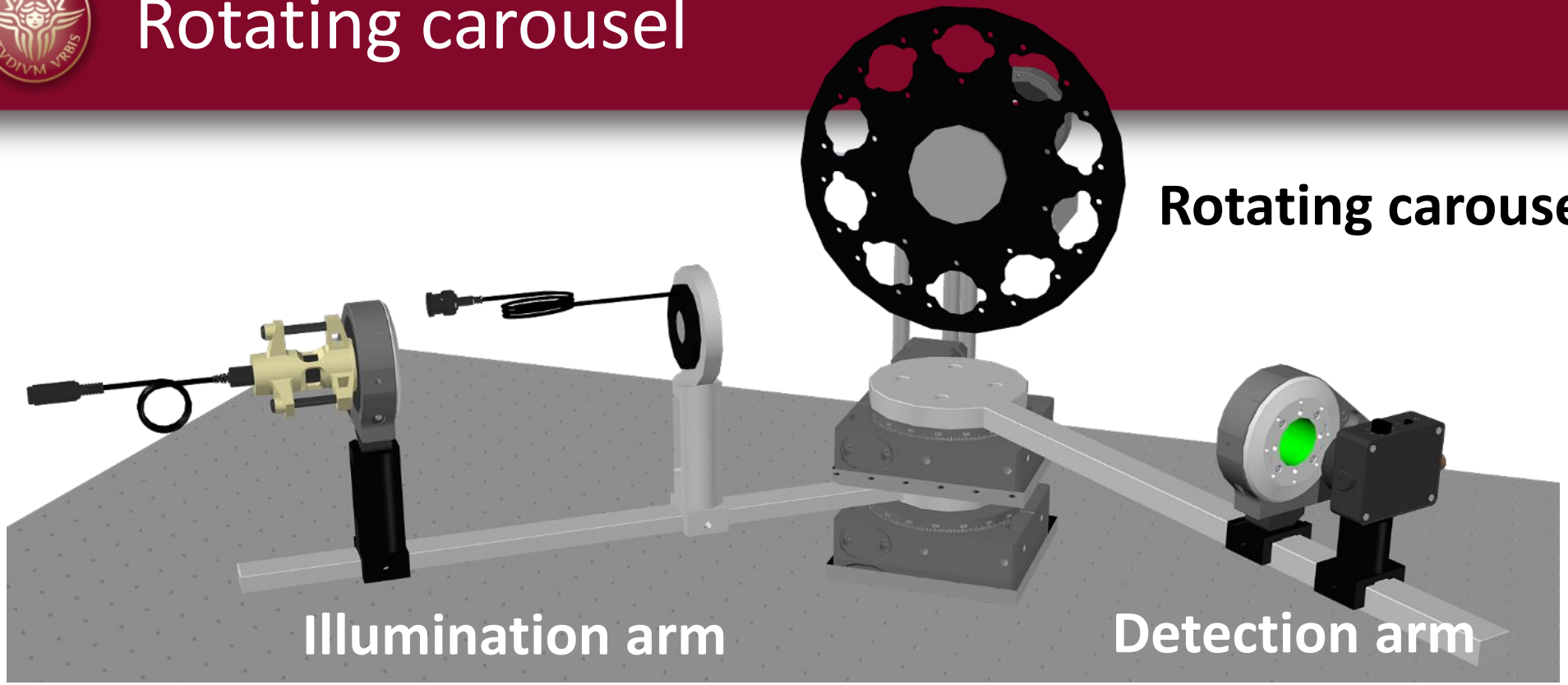


Rotating carousel



The rotating carousel:

- Can be rotated in steps of 36° to select the standard sample to be used;
- Allocates 9 standard samples and an empty location;
- The standard samples are described in the *Description of the samples* doc