Status on PbWO4 Crystals

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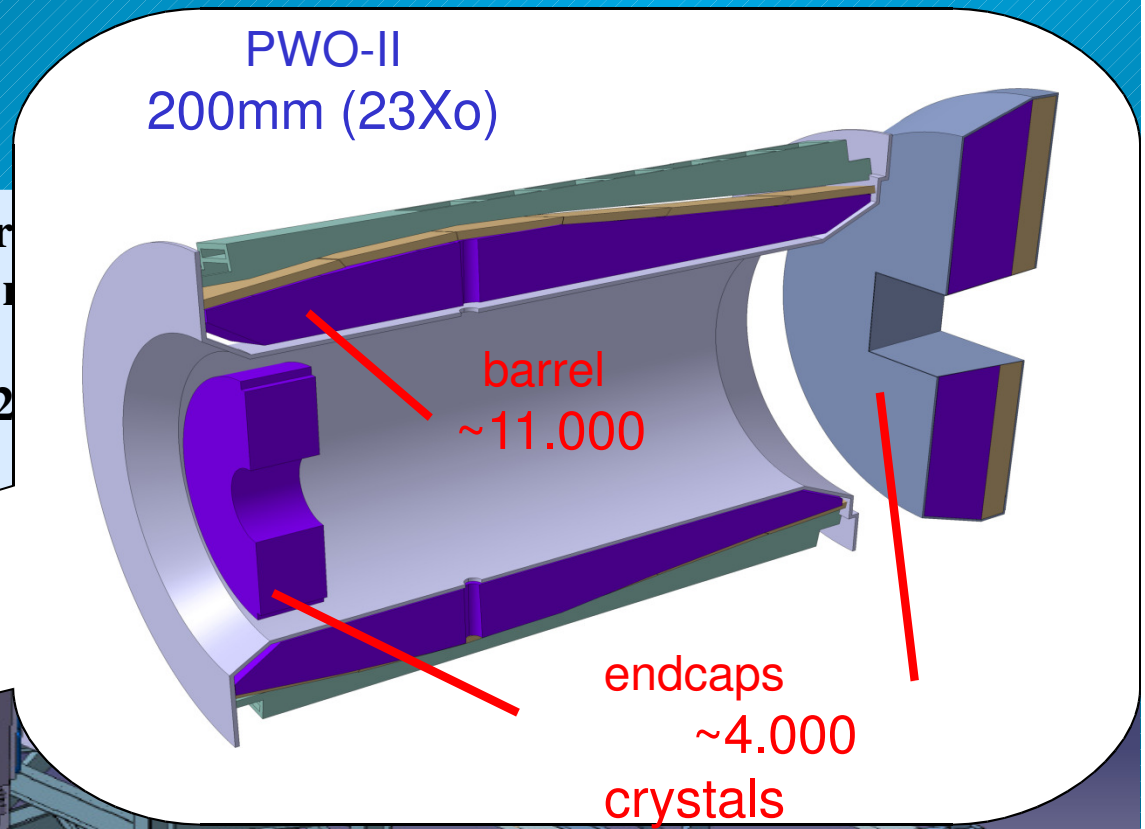
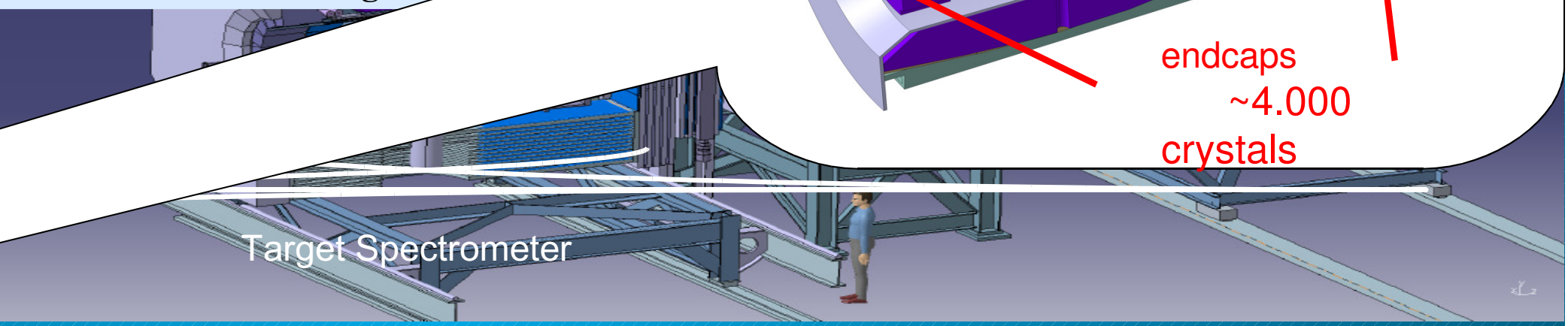
and for the PANDA collaboration

- The PANDA requirements
- The properties of PWO-II based on BTCP production
- Alternative Manufacturer
  - SICCAS
  - CRYTUR
- Alternative Scintillators

the PANDA detector at FAIR

- photon detection with high r
  over a large dynamic r
  10MeV < Eγ < 15GeV
- high count-rate capability (2
- nearly 4π coverage
- sufficient radiation ha
- timing inform





4π δετεχτορ φορ σπεχτροσχοπψ ανδ ρεαχτιον δψναμιχσ ωιτη αντιπροτονσ

the Target Spectrometer:

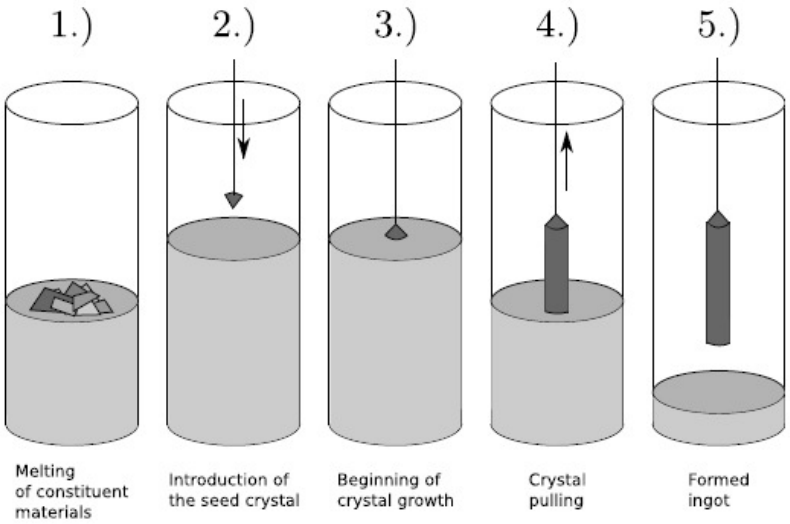
based on high-quality PWO-II

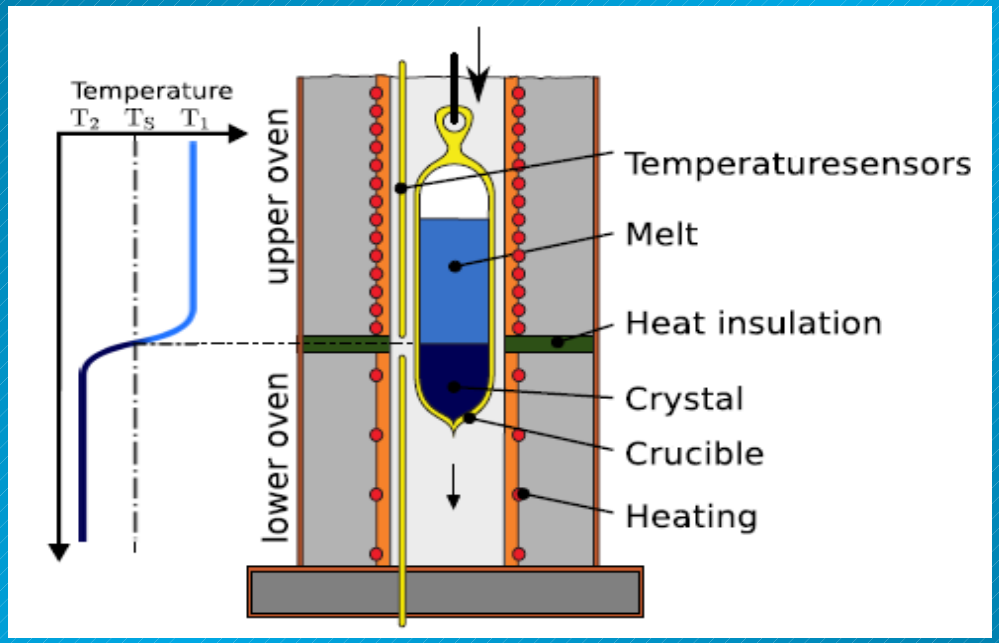
- physical goals of PANDA require further development

	PWO-I (CMS)	PWO-II (PANDA)
luminescence maximum, nm	420	420
La, Y concentration level, ppm	100	40
expected energy range of EMC	150MeV - 1TeV	10MeV - 10GeV
light yield, phe/MeV at room temperature	8-12	17-22
EMC operating temperature, °C	+18	-25
energy resolution of EMC at 1GeV, %	3,4	2,0

how to produce crystals

Czochralsky-method

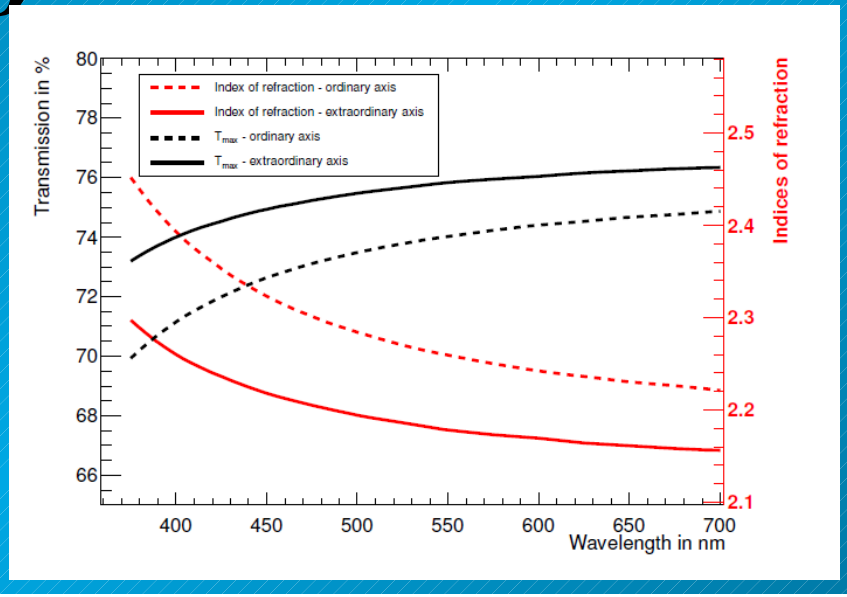




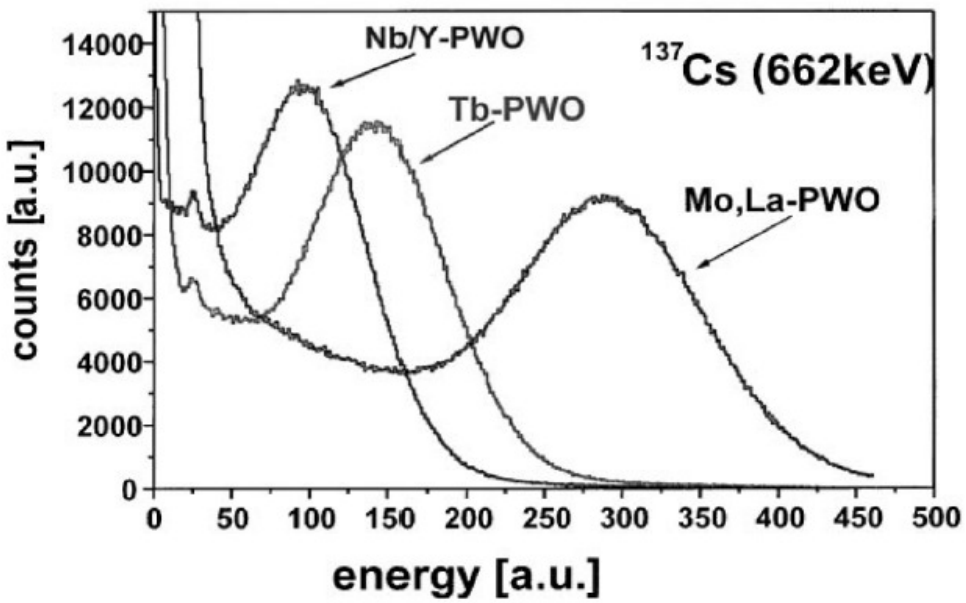
Bridgeman-technology

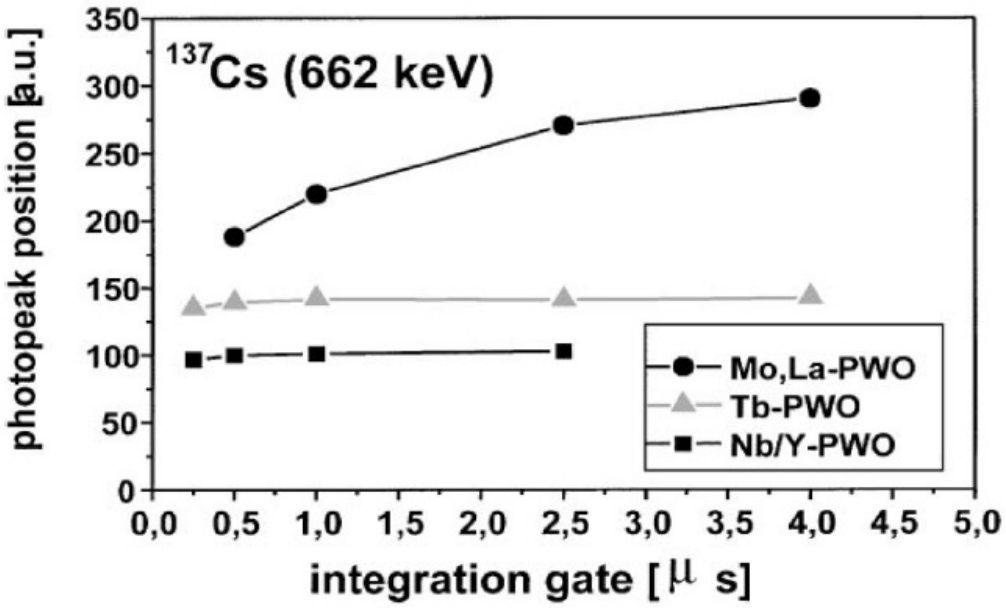
some general remarks on PWO

index of refraction



increased light yield due to doping



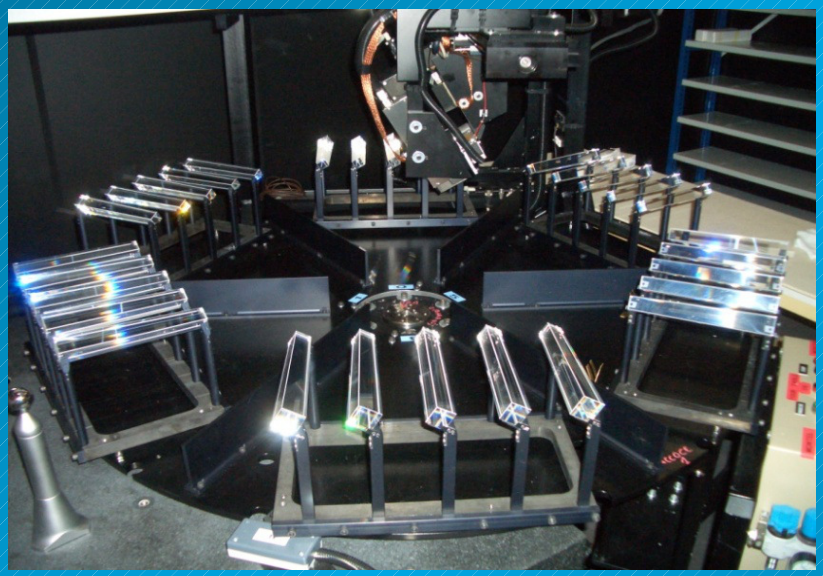


the quality requirements

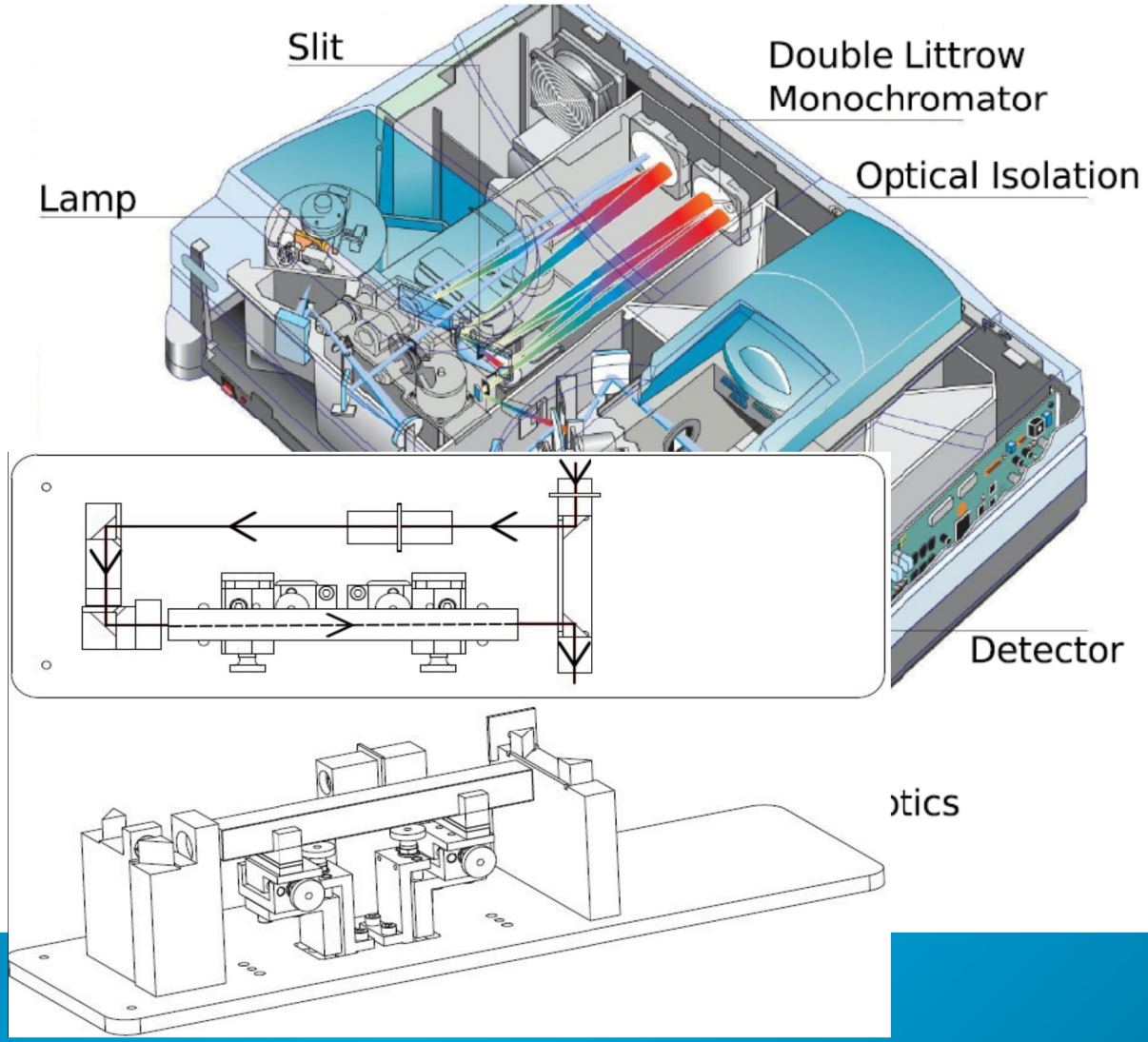
Property	Unit	Limit
longitudinal transmission at 360 nm	%	≥ 35
longitudinal transmission at 420 nm	%	≥ 60
longitudinal transmission at 620 nm	%	≥ 70
non-uniformity of transversal transmission at T= 50%	nm	≤ 3
LY at T= 18 °C	phe/MeV	≥ 16.0
LY(100 ns)/LY(1 μs)		≥ 0.9
induced absorption coefficient Δk at room temperature, integral dose 30 Gy	m^{-1}	≤ 1.1
mean value of Δk distribution for each lot of delivery	m^{-1}	≤ 0.75

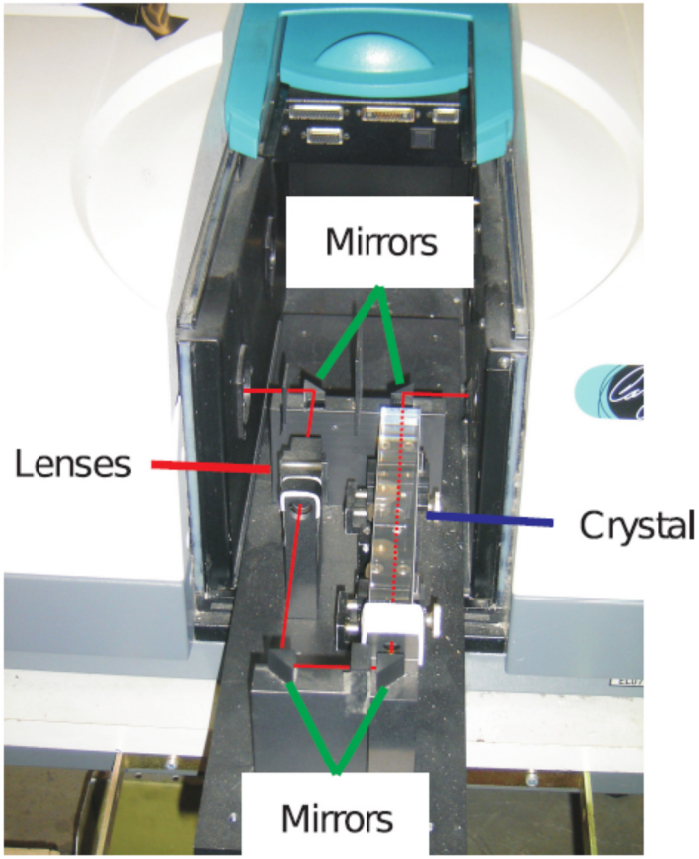
production at BTCP

quality control and performance



the optical transmission

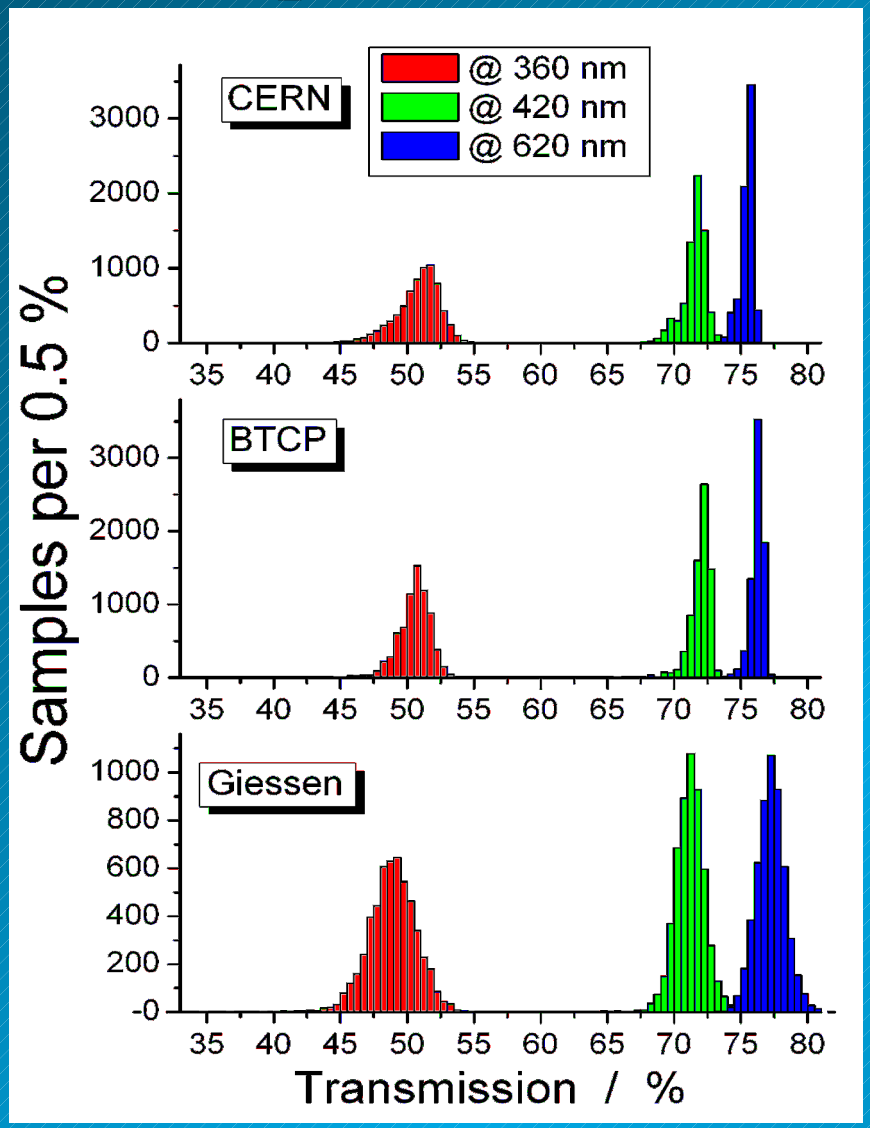




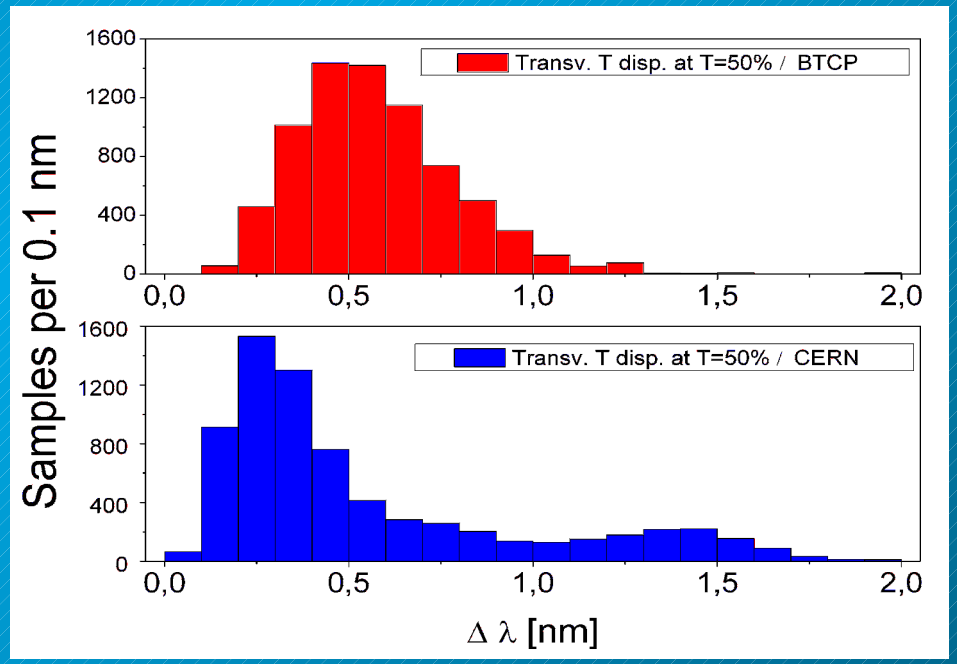
(b) Additional optics by [29].

the optical transmission

property	condition	specification
longitudinal transmission	at 360nm	$\geq 35\%$
	at 420nm	$\geq 60\%$
	at 620nm	$\geq 70\%$
uniformity of transv. transmission	wavelength at $T = 50\%$	$\Delta\lambda \leq 3$nm



longitudinal transmission



homogeneity