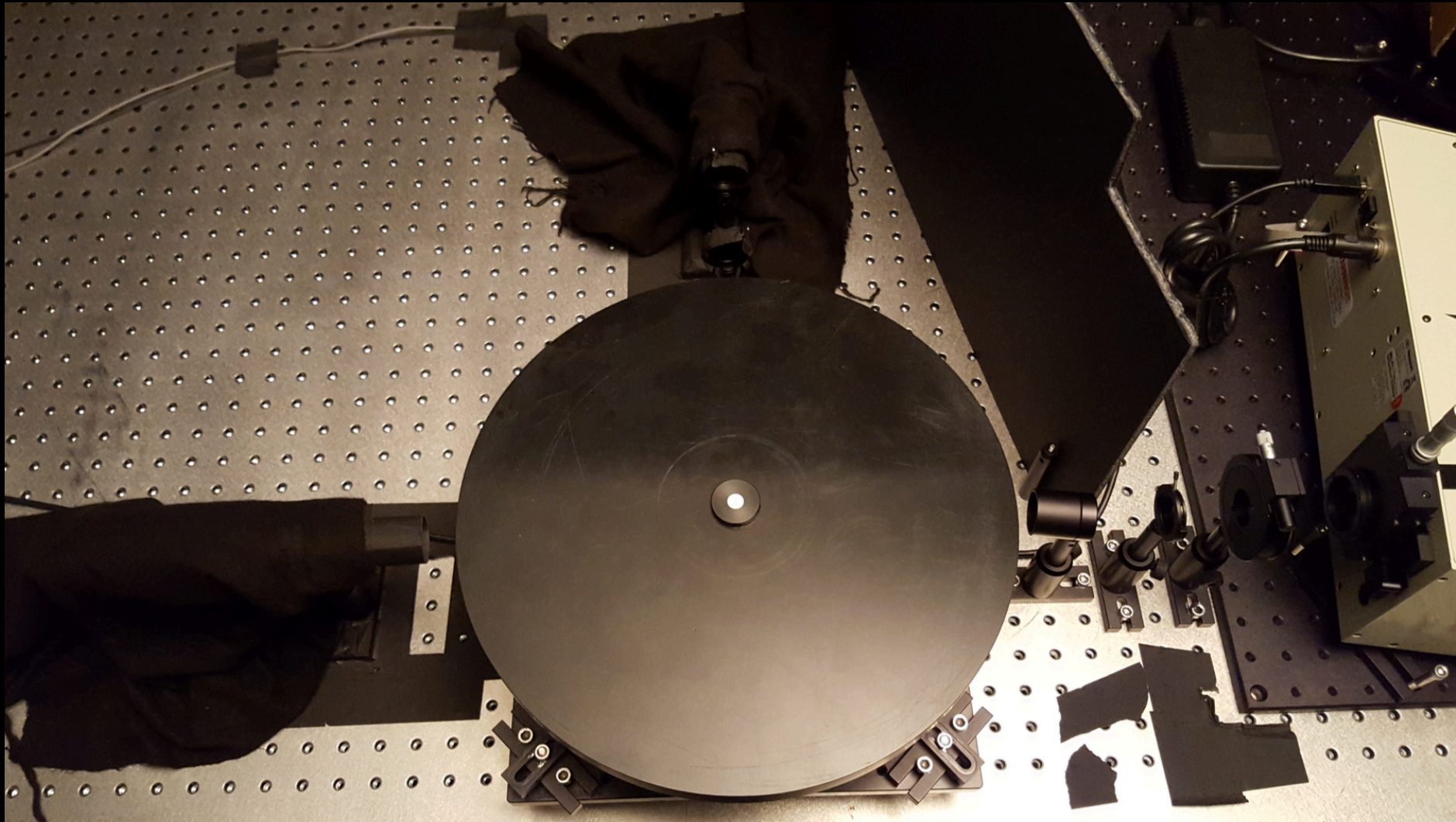


LS characterization in Mainz



THEIA meeting, Hamburg, Mar 23, 2017
Michael Wurm



Current LS R&D projects

- Optical characterization of JUNO LS
- Quantum-dot doped scintillators
- Plastic scintillators

Setups available/under construction

- Scattering length
- Attenuation length monitor (for JUNO)
- Relative light yield measurement
- UV-Vis spectrometer: absorption spectra
- *To come:* UV/vis spectrometer for emission spectra
- *Hopefully to come:* Refractometer (minimum deviation method)

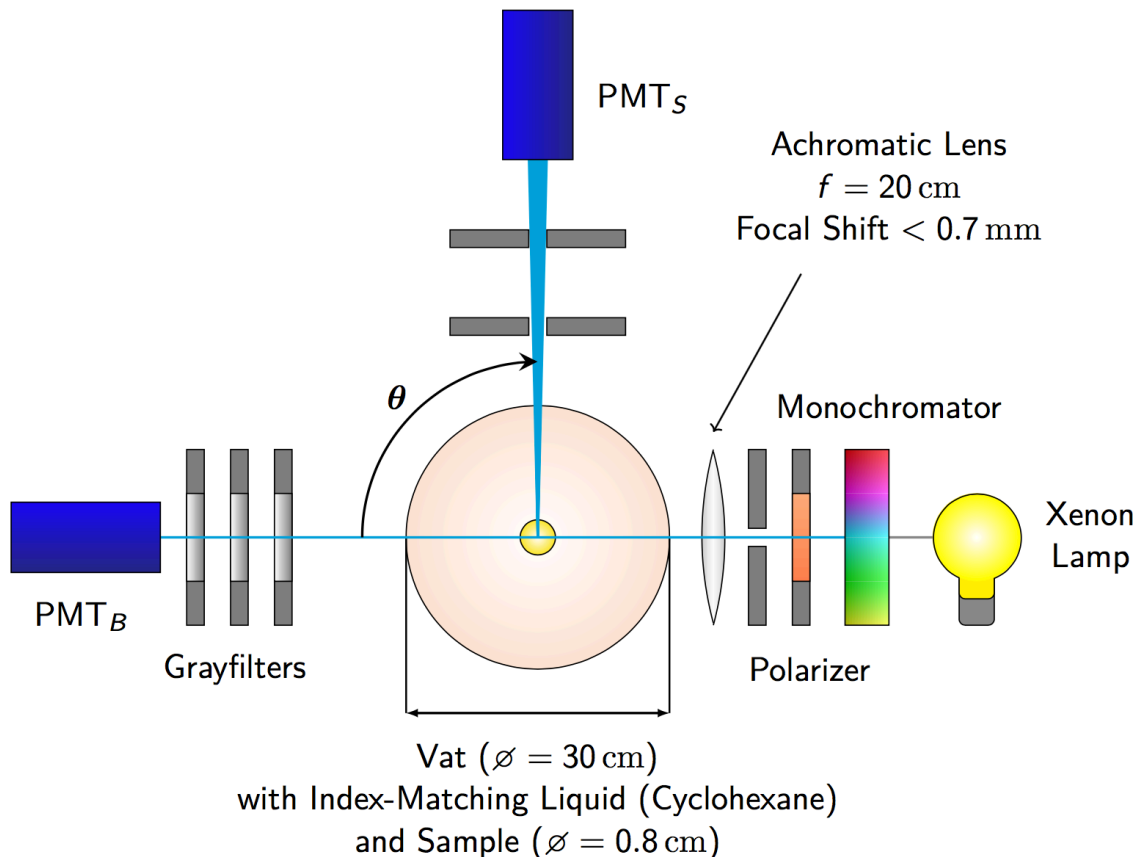


Scattering Length Setup

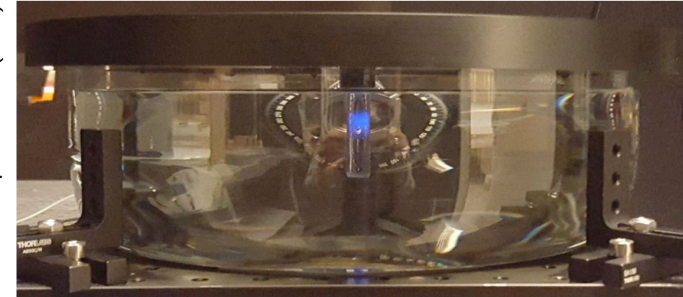
Idea: measure scattering intensity as function of

- wavelength
- scattering angle
- polarization

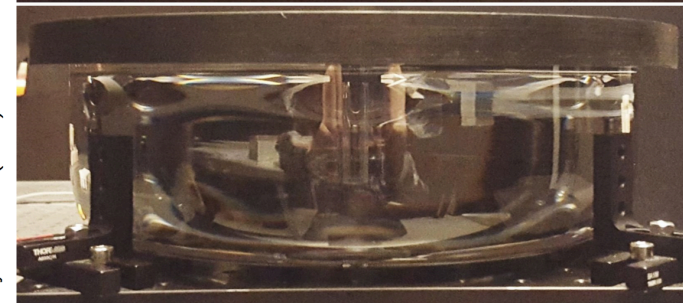
separate Rayleigh
scattering from other
contributions



Ultrapure Water (H₂O)



Cyclohexane (CHX)



First test results for LAB:

410 nm

Measured: $\Lambda_{\perp} = (42.0 \pm 1.9_{\text{stat}} \pm 8.4_{\text{sys}}) \text{ m}$

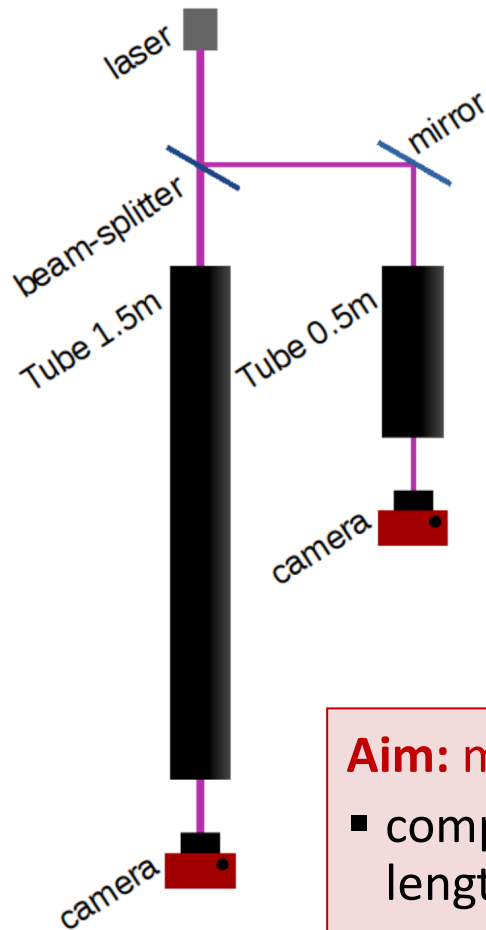
Literature value: $\Lambda_{\text{Ray}} = 36.4 \text{ m}$

430 nm

Measured: $\Lambda_{\perp} = (47.2 \pm 2.3_{\text{stat}} \pm 9.5_{\text{sys}}) \text{ m}$

Literature value: $\Lambda_{\text{Ray}} = 44.0 \text{ m}$

Attenuation Length L_{att} Monitor



Aim: measurement of L_{att} with $\Delta L < 1\text{m}$ @ 20m

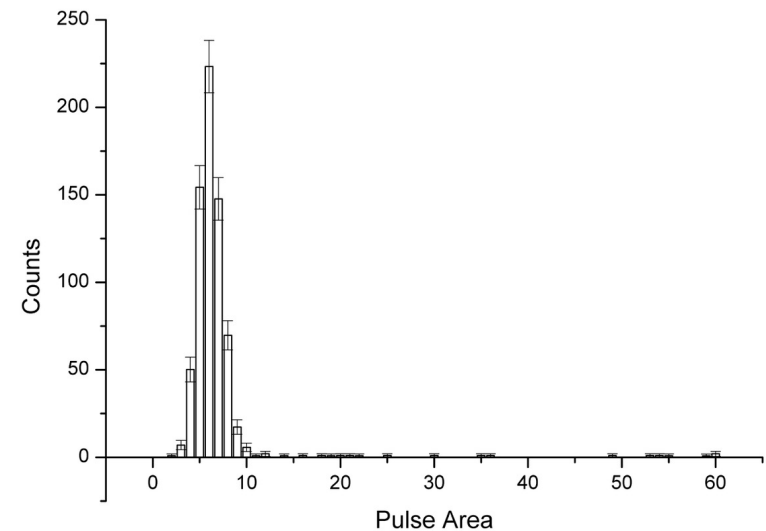
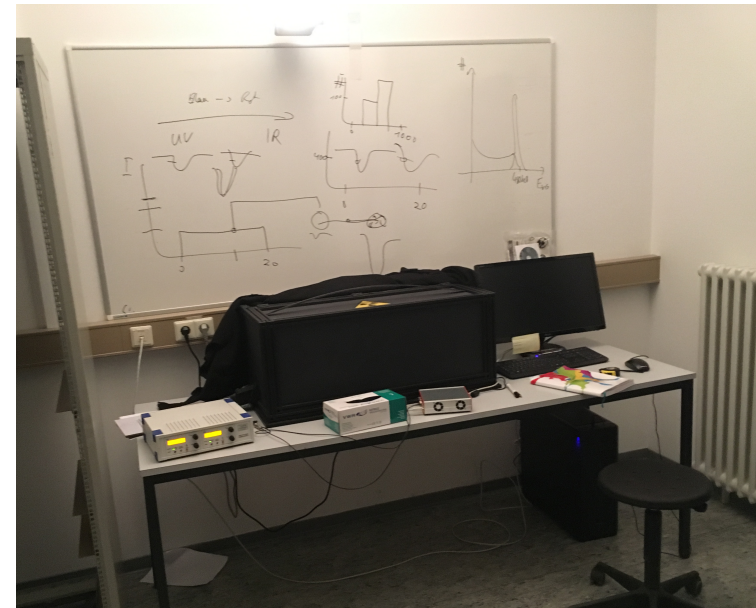
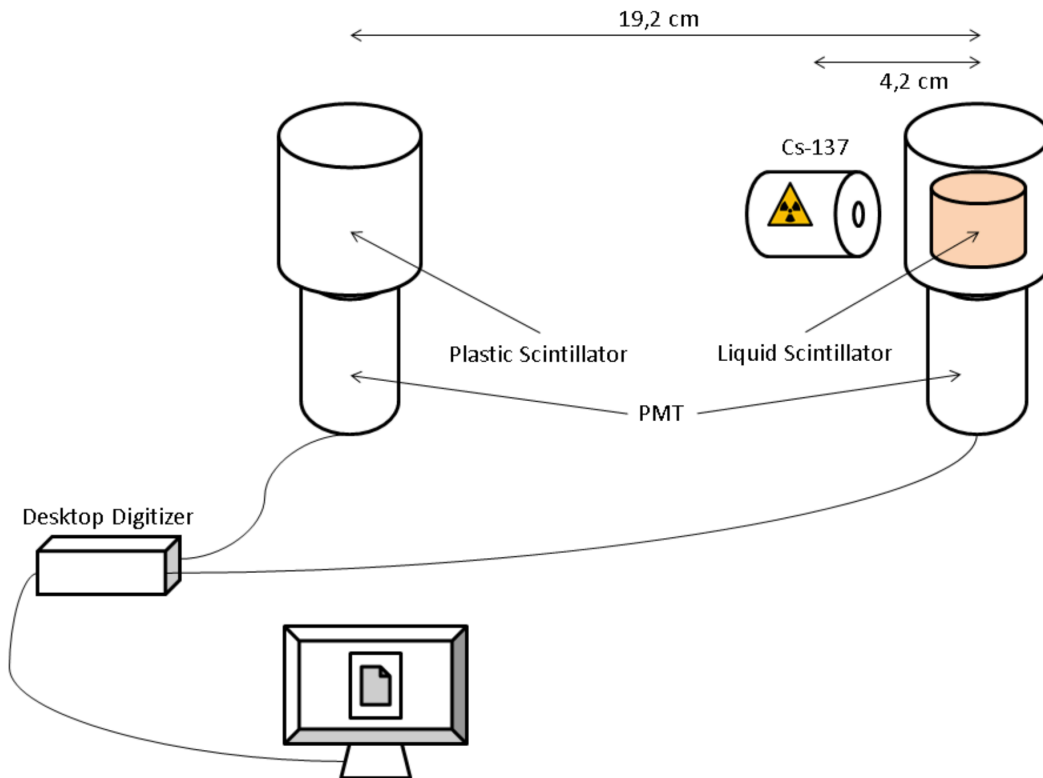
- comparative measurement of attenuation length over two tubes of different lengths
→ cancelation of most systematics
- Inline/on-site system for JUNO purification
→ robustness (avoid elaborate optics)

Relative light yield measurement

Backscattering of ^{137}Cs gamma-rays in LS

→ Coincidence setup

→ Subtraction of Compton background



UV/vis spectrometer: Absorption

PE Lambda 850: $\Delta\lambda = \text{nm}$, $\Delta A/A = 10^{-6}$?
Space for 10 cm quartz cuvettes

