

## Scintillator characterization with

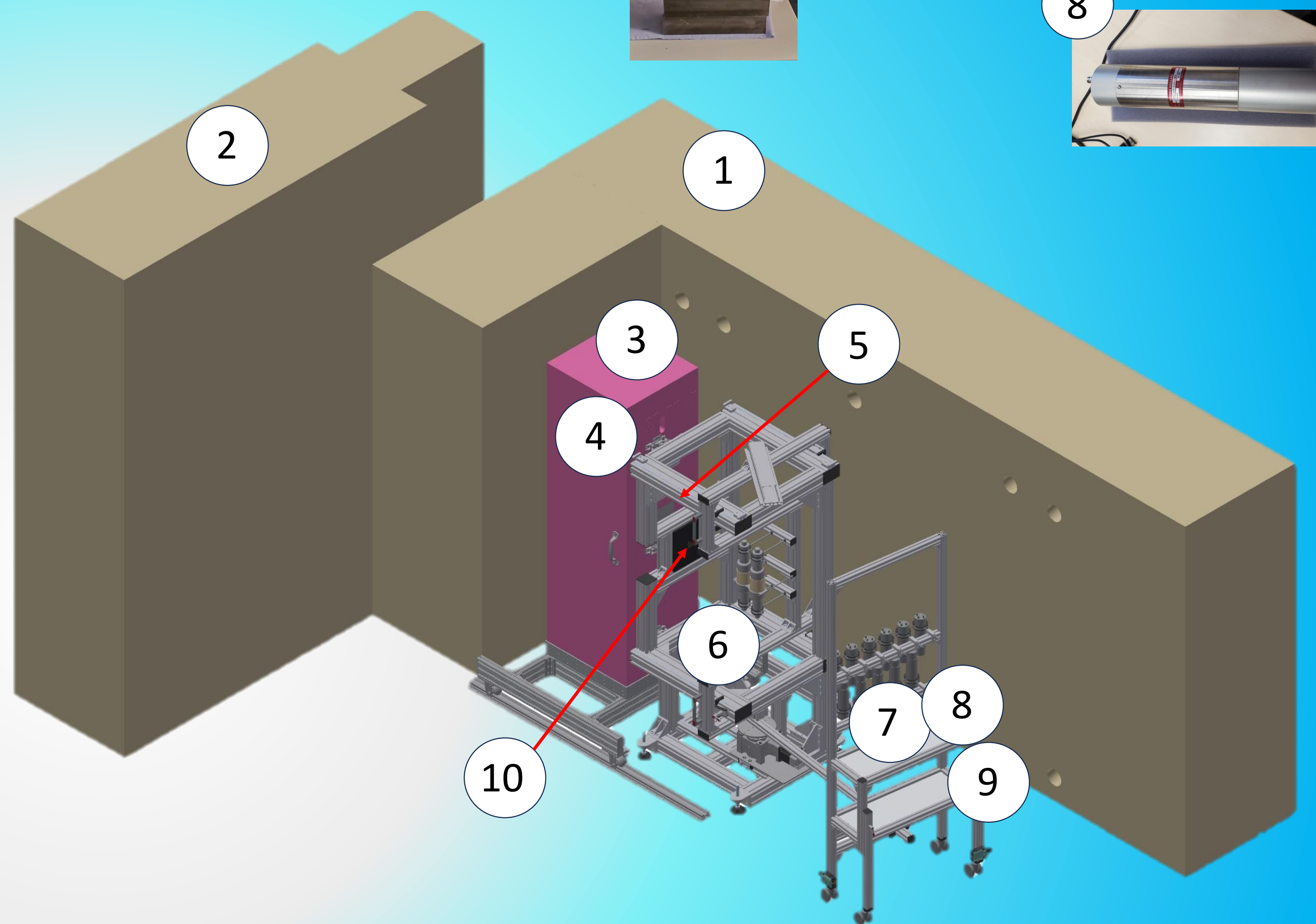
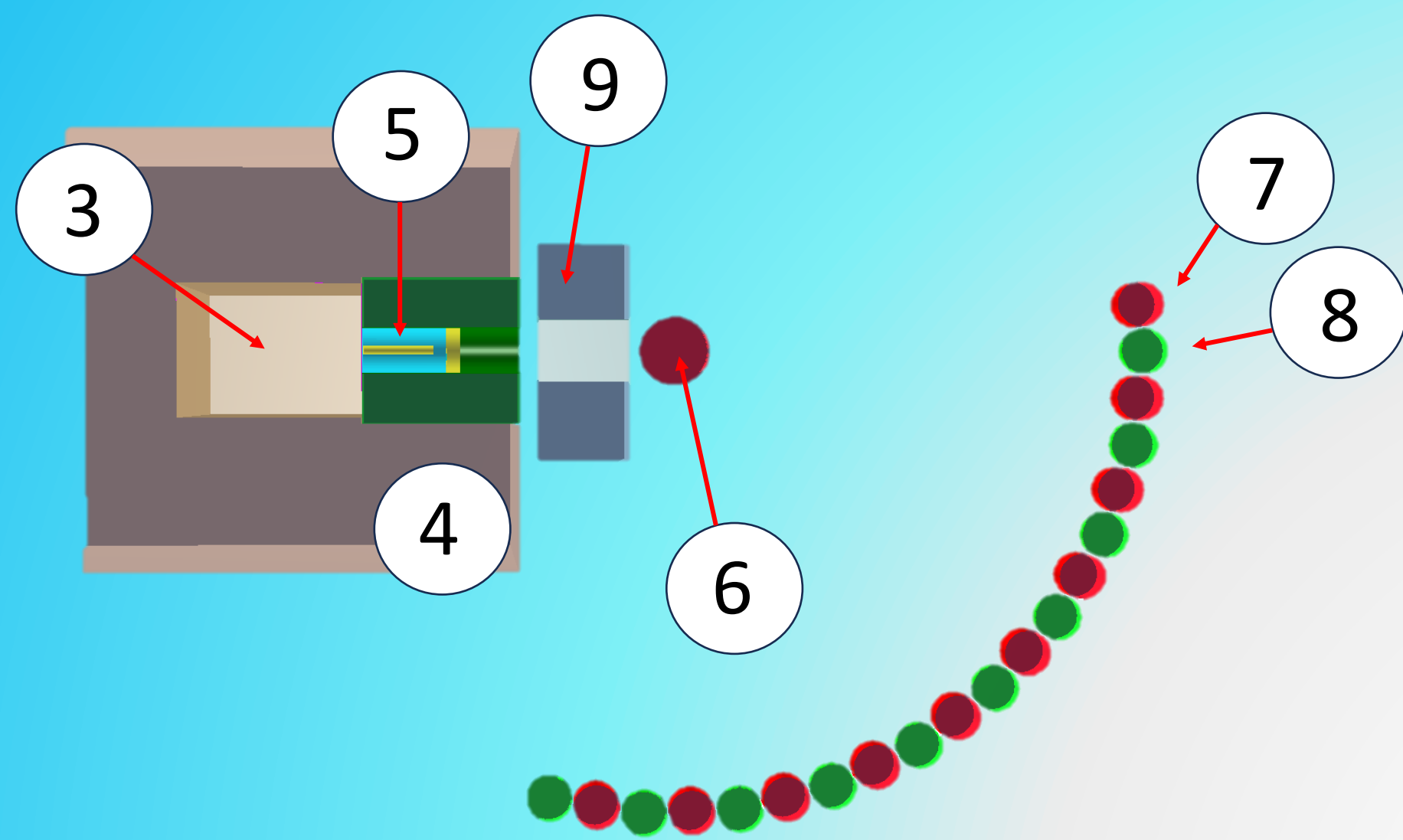
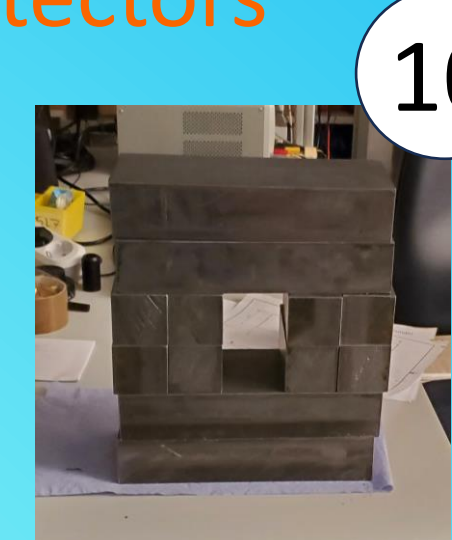
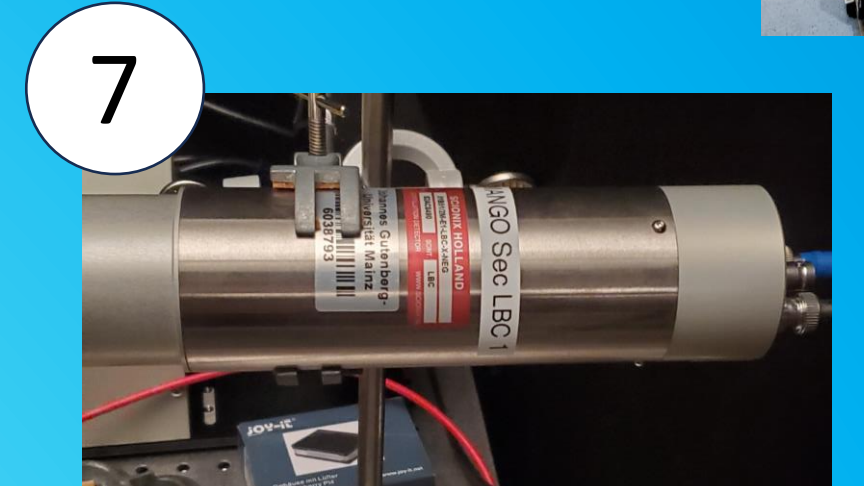
The Mainz Advanced Neutron Gamma Observatory

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### General information

- Investigation of **liquid scintillator** linearity with **neutrons** and **gammas**:
  - Calibration** at higher gamma energies as accessible with **radioactive sources**
  - Pulse shape discrimination** of neutrons and gammas
  - Liquid scintillator quenching** and **proton pulse shapes**
- Two operation modes: **Only 2.45 MeV neutrons** or **9 MeV gammas** from **neutron-gamma converter**
- Dedicated secondary detectors for **scattered neutrons** and **gammas** at variable scattering angle

- Concrete bunker
- Bunker door
- DD-neutron generator,  $E_n = 2.45$  MeV
- Borated PE shielding of neutron generator
- Neutron-gamma converter (nickel),  $E_\gamma = 9$  MeV
- Scintillator test cell, surrounded by PMTs
- Lanthanum BromoChloride gamma detectors
- Plastic scintillator neutron detectors
- Movable detector frame
- Lead collimator for gammas



### Scintillator analysis chain

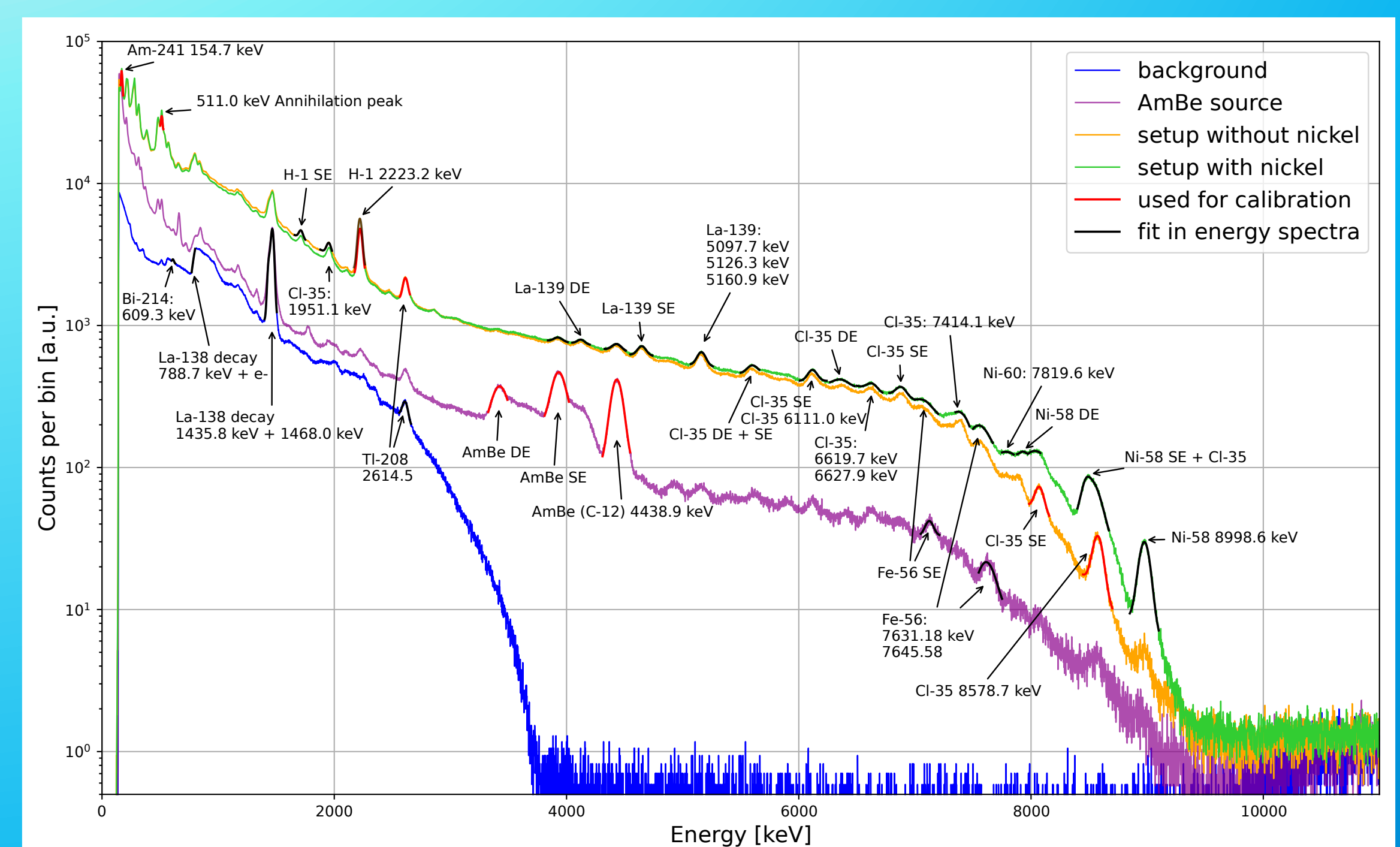
#### Observables:

- Energy deposition in target (test scintillator surrounded by PMTs)
- Hit time in target
- Hit time in secondary detector
- Energy deposition in secondary detector
- Scattering angle

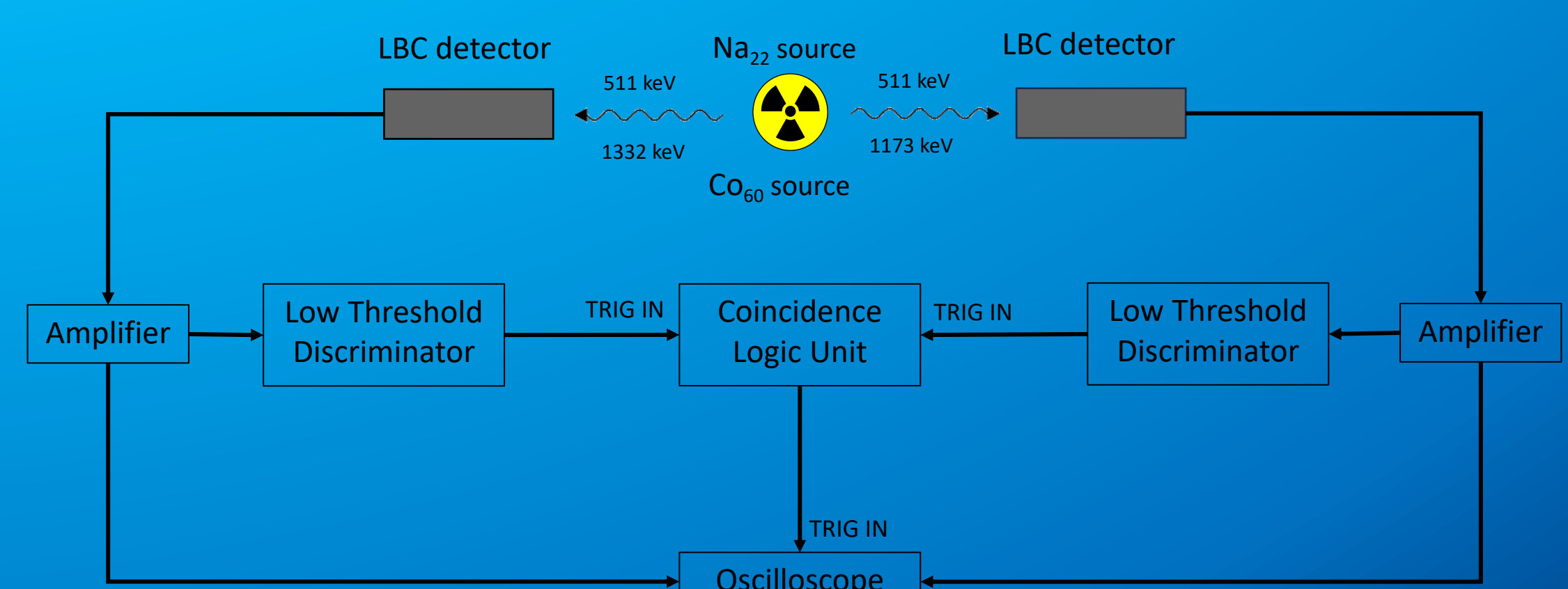
Neutron mode	Gamma mode
Time difference of > 23 ns between target and secondary detector	Time difference of < 2 ns between target and secondary detector
Energy deposition in target determined based on time of flight	Energy deposition in target and secondary detector should sum up to 9 MeV
Energy deposition in target determined based on scattering angle	Energy deposition in target determined based on Compton scattering angle
<b>Consistency check of energy deposition observed in target</b>	

### Setup characterization

- Tests of the **neutron-gamma converter** with an AmBe-source and a LBC gamma detector from the secondary array



- Timing of the gamma detectors with  $\text{Na}_{22}$  or  $\text{Co}_{60}$  Coincidences



### Data acquisition system

