

Atomic and nuclear physics

Radioactivity

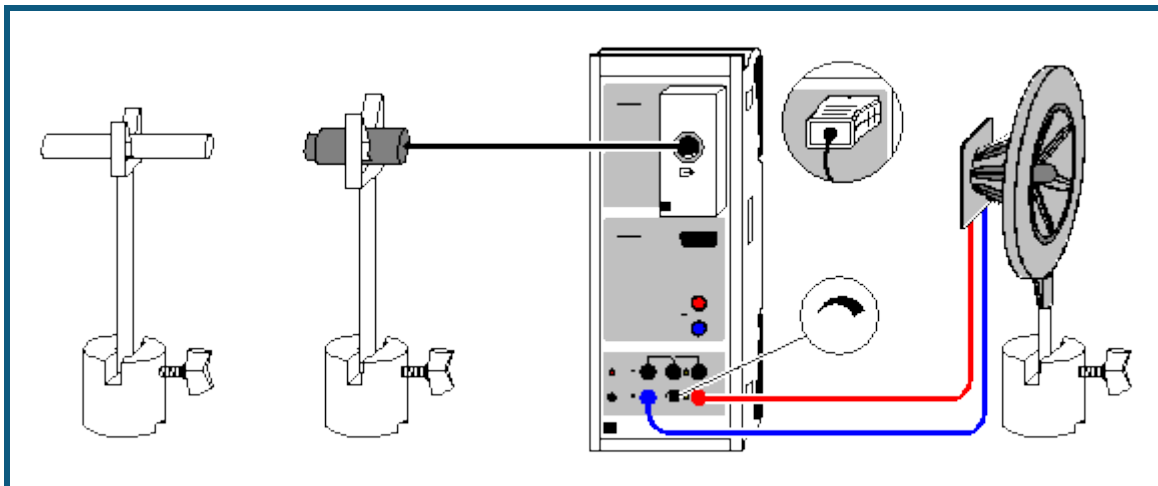
Poisson distribution


Statistical variations in
determining counting rates

Description from CASSY Lab 2

For loading examples and settings,
please use the CASSY Lab 2 help.

Poisson distribution



 can also be carried out with [Pocket-CASSY](#)

Experiment description

The number x of decay events of a radioactive preparation over a time interval Δt is not constant. A large number of individual measurements can be represented as a frequency distribution $H(x)$ scattered around the mean value μ . By comparing this frequency distribution with the Poisson distribution, we can confirm that x shows a Poisson distribution around the mean value μ .

Equipment list

1	Sensor-CASSY	524 010 or 524 013
1	CASSY Lab 2	524 220
1	GM box with End-window counter	524 033 559 01
	or	
1	GM counter tube S	524 0331
1	Set of radioactive preparations	559 83
1	Large clip plug	591 21
1	Small clip plug	590 02
2	Connection rods	532 16
2	Saddle bases	300 11
1	PC with Windows XP/Vista/7/8	

Optional sound output with Sensor-CASSY



1	Tweeter	587 07
1	Saddle base	300 11
1	Pair of cables, 50 cm, red and blue	501 45

Experiment setup (see drawing)

The end-window counter is connected to the GM box at input A of Sensor-CASSY. Handle the counter tube and the preparation with care.

Carrying out the experiment

■ Load settings

- If necessary, modify the gate time Δt ([Settings RA1](#)).
- Preset the measurement if necessary. Enter the number of measurements as the stop condition of the [Measuring Parameters](#) (**Window** → **Show Measuring Parameters**, e.g. $n > 1000$ for 1000 individual measurements).
- Start the measurement series with , and stop it again with  after recording the series.

Evaluation

In the evaluation, you can compare the measured frequency distribution with a [Poisson distribution](#). For higher mean values μ the Poisson distribution develops into a [Gaussian distribution](#).