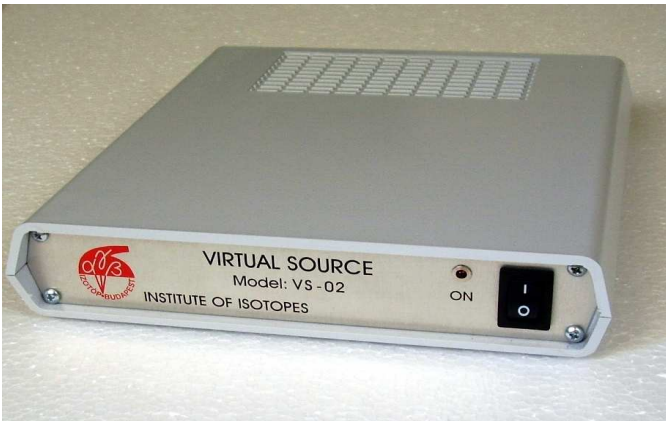


# Virtual Source VS-02

Neutron coincidence counting is one of the most important tools of nuclear safeguards. Proper application of it, however, requires good training and practical experience which takes not only time but requires access to different kind of neutron sources and detectors. There are only a few laboratories possessing all this.

With a Virtual Source neither a source nor a detector is needed for the neutron coincidence training. They are replaced by a library of previously recorded impulse trains.



Virtual Source is a device for reproducing impulse trains recorded with a list mode device. The system consists of a hardware unit and a program running on a PC. The hardware unit outputs electrical impulses like a detector.



Impulse trains replayed with the Virtual Source system are not to distinguish from real signals. All distributions, coincidence rates and dieaway time can be calculated as with the original impulse trains.

Source	Real source		Virtual source	
	S (cps)	D (cps)	S (cps)	D (cps)
AmLi	13307 (2)	1,23 (0,7)	13305 (2)	1,6 (0,9)
Cf-1	29612 (5)	5172 (10)	29599 (4)	5180 (9)
Cf-2	3501 (2)	618 (2)	3502 (1)	621 (2)
Cf-3	5698 (2)	1010 (2)	5700 (1)	1015 (2)
Cf-4	12575 (2)	2218 (4)	12574 (2)	2218 (4)
AmBe-1	29209 (4)	81 (8)	29210 (5)	89 (8)
AmBe-2	10555 (2)	21,3 (2)	10556 (2)	23 (3)

## Virtual source replaces real source and detector



- High efficiency detectors are difficult to move because of their large mass
- Transporting radioactive sources especially nuclear ones involves a lot of administration
- Using radioactive sources requires a lab with radiation protection equipment

With a virtual source neither a source nor a detector nor paperwork is needed for neutron multiplicity training.



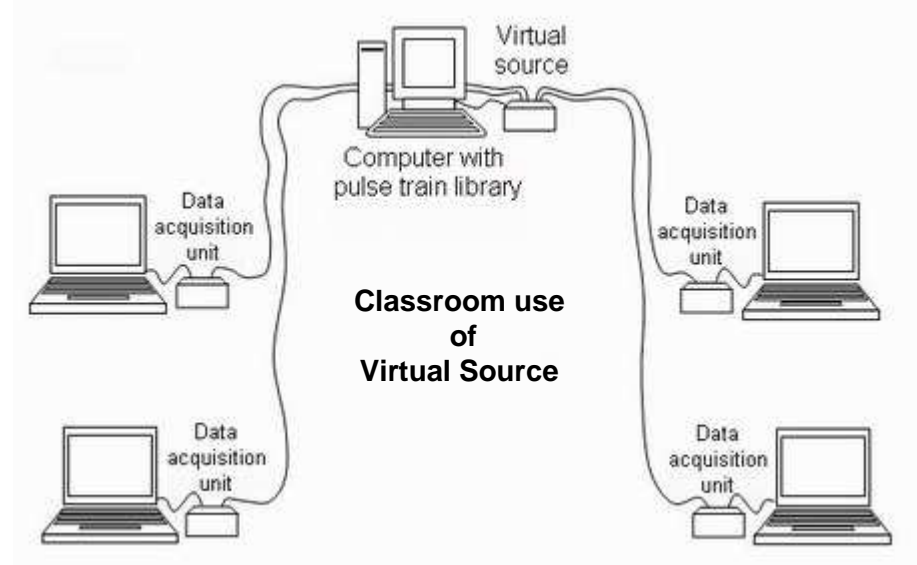
- The virtual source system can be transported like a laptop and no paperwork is needed
- Great freedom in establishing training sites because some training can be performed without any real sources
- Replays list mode data and software-generated artificial pulse trains
- Can feed any standard data acquisition unit e.g. JSR-14, AMSR, PTR

## Training and Educational Tool

For educational use a three-level exercise plan was developed from basic level up to a complete measuring exercise. There are several simple tasks at every stage. Follow-up time, multiplicity and Rossi-Alpha distributions used in neutron coincidence counting are presented.. Trainees are introduced to basic properties by using artificially generated impulse trains. Spectra of most frequent sources is presented and trainees can apply basic knowledge to real spectra.

The program is rounded up with a complete measuring exercise. Neutron sources are categorized by D/S ratio obtained by multiplicity counting.

The program can be carried out in a common classroom, as there is no radiation hazard with virtual source.



## Specifications

- Reproduction rate : max.  $2.5 \cdot 10^6$  cps
- Output pulse: 30 ns TTL
- Timing resolution:  $\pm 5$ ns
- Connectors on rear panel:
- Output: 4 BNC connectors (50 Ohm TTL)
- USB: Type B receptacle, USB 2.0
- Power: DC 5 V, 2.5 A
- Dimensions: 180 mm \*200 mm\* 40 mm

## Contact

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