

# Knowledge and evidence over fear of invisible radiation via practically oriented teaching with a particle camera instrument

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**Abstract.** The invisible ionizing radiation often evokes fears in people's minds as there is no easy way to show and evaluate real impact on their existence. The educational kit SESTRÁ (School Educational Set with Timepix for Radiation Analysis) has been developed at IEAP CTU in Prague with intention to allow easy access to microcosmos experiments, to anyone, practicable in regular classes. The contribution presents the potential of practically oriented teaching and experience gained with students at various levels of education when they get exposed to clear evidence on properties of various radiation types and presence in the surrounding environment.

## Radioactivity all around

Ionizing radiation, unfortunately, completely hidden to the human eye, existing universe long, is often presented as a mysterious, unstoppable and devastating power. Young children become exposed to catastrophic movies as the first encounter. Such an experience leaves certainly a negative imprint on the subconscious. It may emerge each time when the word radiation is being mentioned leading to tendency to act unreasonable due to an innate tendency to protect against threat. However, in reality, ionizing radiation should be referred to as something natural as it is omnipresent in the environment we all live in.

## Knowledge and evidence over the imprinted fear

The Particle camera[1][2], as a very successful outcome of the knowledge and technology transfer initiative organized by the CERN Medipix collaboration[3], with significant contribution of IEAP CTU in Prague[4], has been developed in order to make the cutting edge detecting technology available in the field of education. The SESTRÁ kit equipped with the pixel detector and a wide set of accessories allows practice experiments at any classroom desk.



Fig.1. Left - Elementary school students performing observations at classes, Centre - Detail look at the set-up of the particle camera instrument, Right - observation performed with a bare detector without any radioactive sample placed close to the detector showing non-zero activity proving presence of background radiation.

## Instantaneous awareness about presence of radiation makes people thinking differently

The strong point of practically oriented physics teaching utilizing the particle camera instrument [5][6] is the invaluable ability to render experiment results in real time. The possibility of in-vivo demonstrations generally attracts the attention of students and it convinces them of the presented physical phenomena that they are observing. The Fig.2 presents exemplar visual results for observations obtained with the particle camera showing the way how interacting radiation is being seen by a pixel detector.

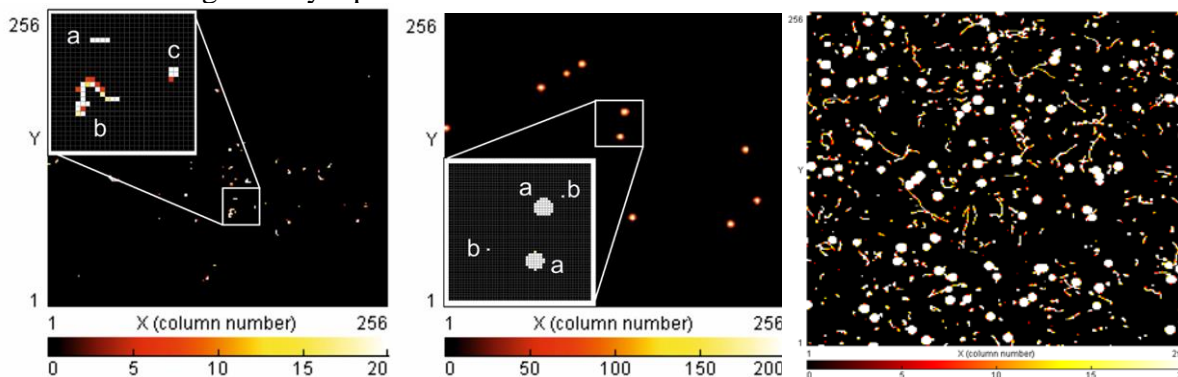


Fig. 2. Detailed look at characteristic tracks caused by various types of interacting radiation: Left - gamma or beta (a,b,c), Center - alpha particles (a) and x-rays (b); Right - An exemplar experiment result - focus on radon presence observation by means of the air filter put close to the detector (after 5 minutes letting air to pass through the filter using a vacuum cleaner)

## Practically oriented teaching benefits

The contribution presents benefits of practically oriented teaching using a particle camera for real time demonstrations convincing students to consider radiation as a natural part of the environment we all live in. Long term experience proved, when the guidelines [7] are adapted adequately to reflect age of students, that even very young minds can gain realistic awareness.

## References

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