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Using Timepix pixel detectors in educational physics experiments about natural radioactivity and cosmic rays

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Within the education context, radiation imaging devices like pixel detectors based on the Timepix chip offer advantages compared to traditional detectors for ionising radiation [1]. In contrast to simple Geiger counters, the energy of single and low-energetic particles or photons can be revealed. Different types of ionising radiation are distinguished based on the shapes of recorded pixel clusters similar to traces in a cloud chamber. Pixel detectors are sensitive enough to measure low-intensity environmental radiation whereby the usage of problematic radioactive sources can be avoided. This is an important benefit for learning places.
We show examples of exploring natural radioactivity as well as cosmic particles in educational physics experiments using Timepix. With the help of static electricity and filter paper, radon progeny is collected from drinking water, air and cigarettes providing harmless samples of alpha radiation [2]. These sources of heavy ionising particles are contrasted with the measurement of cosmic rays. After appropriate filtering and analysis of pixel clusters, general properties of minimum ionising particles from atmospheric muons are revealed.

[1] T. Whyntie et al (2015) CERN@school: demonstrating physics with the Timepix detector, Contemporary Physics, 56:4, 451-467
[2] M. Pohl, H. von Philipsborn (1996) Recent Progress in Sampling and Measurement of Radon and Thoron decay products, proceedings of IRPA9, Volume 2

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