DESCRIPTION OF THE RECOMMENDED PROJECT

Pixel detector MX-10

1. Introduction

The project focuses on the progressive detector technology of pixel detectors. Medipix is a family of read-out chips and detector assemblies for particle detection and imaging developed by the Medipix Collaborations (https://medipix.web.cern.ch). The original concept of Medipix is that it works like a camera, detecting and counting each individual particle hitting the pixels when its electronic shutter is open. This enables high-resolution, high-contrast, noise hit free images – making it unique for imaging applications. Pixelman SW for control and evaluation of Medipix/Timepix detectors was developed and licensed by the Institute of Experimental and Applied Physics (IEAP) of the Czech Technical University in Prague. The R/O interface MX-10, based on the Medipix/Timepix detector, is produced by the Czech company Jablotron in cooperation with IEAP.

2. Main part

Students will learn how to work with a pixel detector, learn how to set measurement parameters and evaluate their own measurements. The basic types of radiation of several emitters will be distinguished according to measured tracks. Students will also examine the radiation background including cosmic rays muons. They will learn how to build simple experiments for the examination of properties of radioactivity.

3. Description of work

Students' workplaces will be equipped with a MX-10 Edukit set. Students will work in pairs.

MX-10 Edukit set

At first, students will learn how to control the pixel detector, understand the measured data, and draw charts under the guidance of a lecturer. In pairs, they will independently perform their own experiments according to the book Experiments Using Pixel Detectors in Teaching Nuclear and Particle Physics. Students will present the results of their own measurements during the final presentation.

Time schedule:

8. 7.	Installation of software for student notebooks, getting acquainted with the detectors
9. 7.	Common measurement supervised by a supervisor
10. – 11. 7.	Self-study and independent work with pixel detectors
12. 7.	Common measurement supervised by a supervisor
13. – 14. 7.	Self-study and independent work with the pixel detectors
15. 7.	Common measurement supervised by a supervisor
16. – 17. 7.	Own measurement and preparation of the final presentation

18. 7. Discussion of the results with a supervisor
19. 7. Presentation of the measurement results

Adjustable experimental positioner with School radiation source (ŠZZ Alfa).

4. Requirements to the student

Each student should have their own notebook with Windows and MS Office Excel. No special knowledge is required from students.

5. Recommended literature

V. Vicha. Experiments Using Pixel Detectors in Teaching Nuclear and Particle Physics

6. Number of accepted students:

4 workplaces will be prepared and 2 students will work on each of them. The project is designed for 8 students.

7. Project supervisor:

The supervisor is Dr. Vladimir Vicha, a scientist from the IEAP CTU and an experienced high school teacher of physics and mathematics. His area of interest is pixel detectors and their use in teaching physics. He is the author of the book Experiments Using Pixel Detectors in Teaching Nuclear and Particle Physics.