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#11-152 Multi-platform software suite for data acquisition and analysis with hybrid pixel detectors of the Timepix family

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Timepix detectors (Timepix, Timepix2 and Timepix3) are hybrid pixel detectors that use a square matrix of 256×256 pixels with $55 \mu\text{m}$ pitch. Thanks to their versatile design, compact form factor, desirable energy and time resolution, they have found applications in a variety of fields, e.g. radiation field characterization, tracking, dosimetry and imaging. In this contribution, we present a novel suite of software tools designed to conveniently operate and process data from detectors of the Timepix family. The suite includes a parallelized data acquisition program that is compatible with Katherine readouts. Relying on a centralized backend to store device configuration, the program delivers plug-and-play experience to novice users, and allows experienced users to apply frequent data pre-processing approaches online, for instance clustering, cuts, Time-over-Threshold calibration and time-walk correction. This makes the software particularly suitable for operating radiation monitoring networks in applications, where access to real-time information is critical, e.g. in nuclear decommissioning, medicine and others. Producing structured measurement files that follow a well-defined format based on text or binary encoding, the program's outputs are easily interoperable with the rest of the toolkit as well as popular scripting languages like Python. Recorded measurements can be analyzed using a viewer program, which allows to easily aggregate, filter and visualize large data volumes based on complex user-defined rules. To increase compatibility with older tools, the presented suite also includes a converter utility, which facilitates data migration from legacy formats. Based on the C++ Qt framework, all presented programs offer high performance as well as extensibility via pluggable architecture, permitting easy future adoption of new hardware, such as Timepix4. Binaries are available for download upon request for the majority of Linux distributions, Microsoft Windows and macOS.

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