

Pypleem- a Python framework for PEEM/LEEM data analysis

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Here, we present Pypleem- a novel framework for analysis of PEEM (Photoemission Electron Microscopy)/LEEM (Low Energy Electron Microscopy) and related methods eg. the extraction of XAS (X-ray Absorption Spectroscopy), XL/CD (X-ray Linear/Circular Dichroism) or LEEM intensity-vs-energy spectra. The open source utilities for this purpose are limited to just a few solutions: ImageJ (with additional plugins, and no support for spectra) [1], GSXM [2] or PLEASE (only for LEEM data) [3]. The other option is the LEEM/PEEM package [4] for commercial software IgorPro. Our goal is to provide to the end-users, of aforementioned techniques (especially to new ones), a dedicated, easy and intuitive to use application to analyze the acquired data sets and to expert users a framework for more specialized data treatment.

Pypleem is written in high-level, interpreted language, Python. Python, together with its rich collection of libraries constitutes a powerful, scientific oriented environment ideal to work with multidimensional data. In principle, Pypleem consists of individual, autonomous modules designed for processing of particular category of data: PEEM/LEEM, XAS, XML/CD. These modules are built on top of a data processing engine, which derives from fundamental packages for scientific computing: NumPy, SciPy etc. The modular concept of Pypleem promotes its upgrading: each user can easily extend its functionality by incorporating his own piece of code dedicated for a specific scientific problem.

At the moment, Pypleem can only work with native Elmitec '.dat' files (single or stack). It provides a fully functional graphical user interface (GUI) with integrated data browser that facilitates data management. The data processing engine offers efficient routines for handling, manipulation and representation of n-dimensional data sets. In the near future, several additional features will be implemented including advanced image processing methods in order to optimize automatic data analysis.

Pypleem is at the early stage of development, thus it is of great importance to share our concept with PEEM/LEEM community in order to get feedback. That will help us to customize the application to a form most suited for the end-users.

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