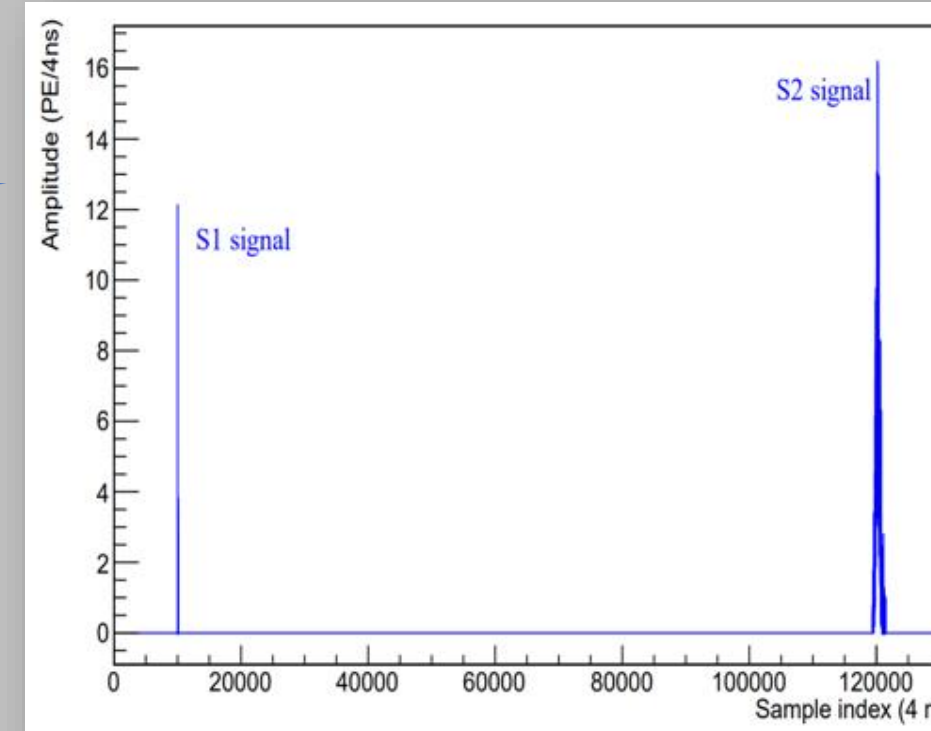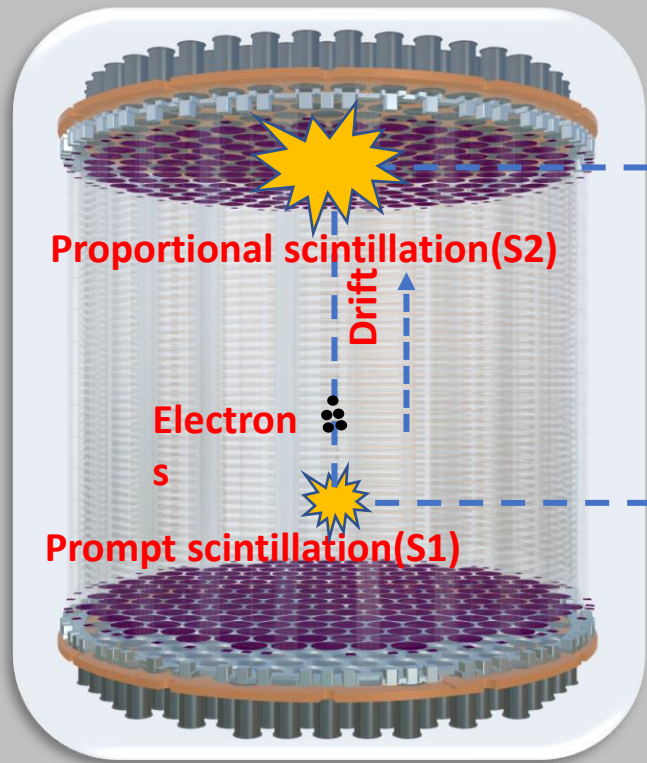# The event data visualization tool for PandaX-4T experiment
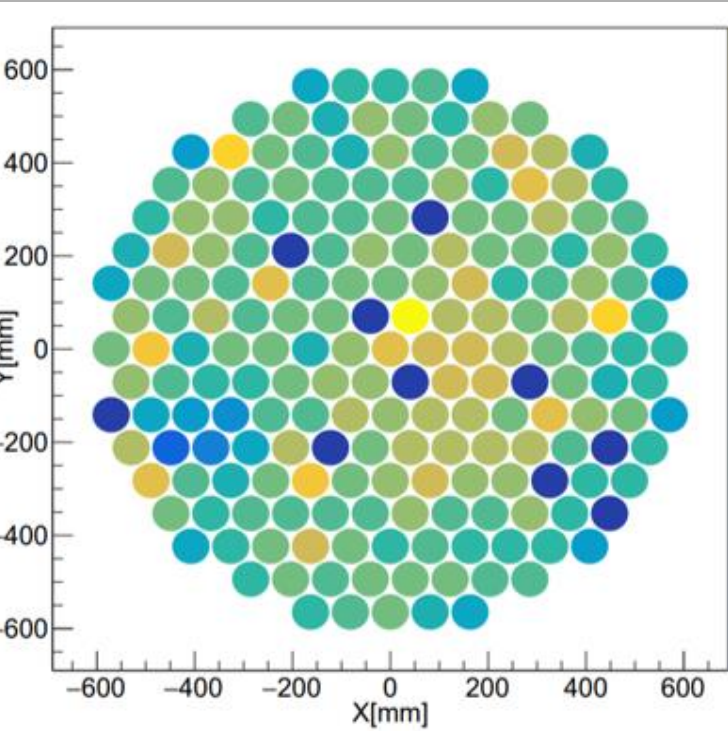
Abdusalam Abdukerim
Shanghai Jiao Tong University
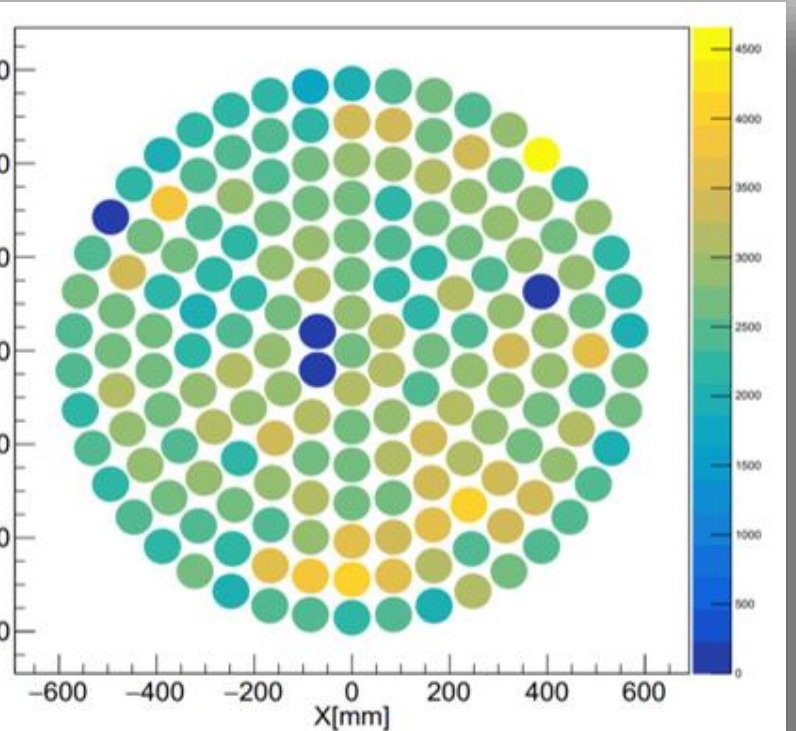
Introduction

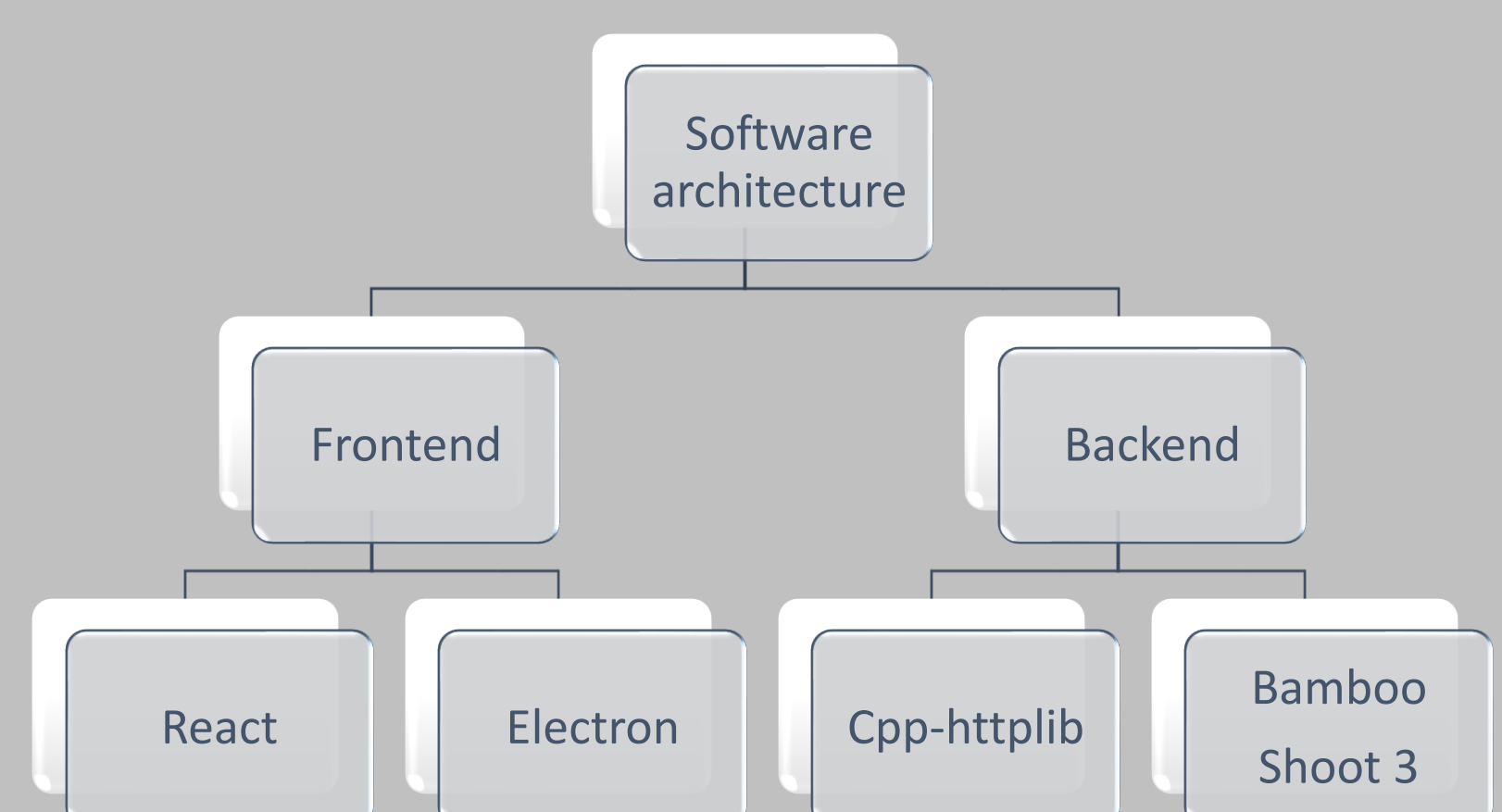Typical waveform — Detected signal pattern on top PMTs — Detected signal pattern on bottom PMTs

- ➢ PandaX-4t using liquid xenon time projection chamber is dedicated to search for the dark matter particles and to study properties of neutrinos.
- ➢ The incident particles with xenon atoms in the TPC can produce the prompt scintillation S1
- ➢ Some electrons drift along the electric field inside the TPC and be extracted into the gaseous region, producing the proportional scintillation S2, both S1 and S2 can be detected by top and bottom PMT arrays.
- ➢ Electronic pulse signals can be transformed into digital signal so that energy and position can be constructed by correlated S1 and S2.
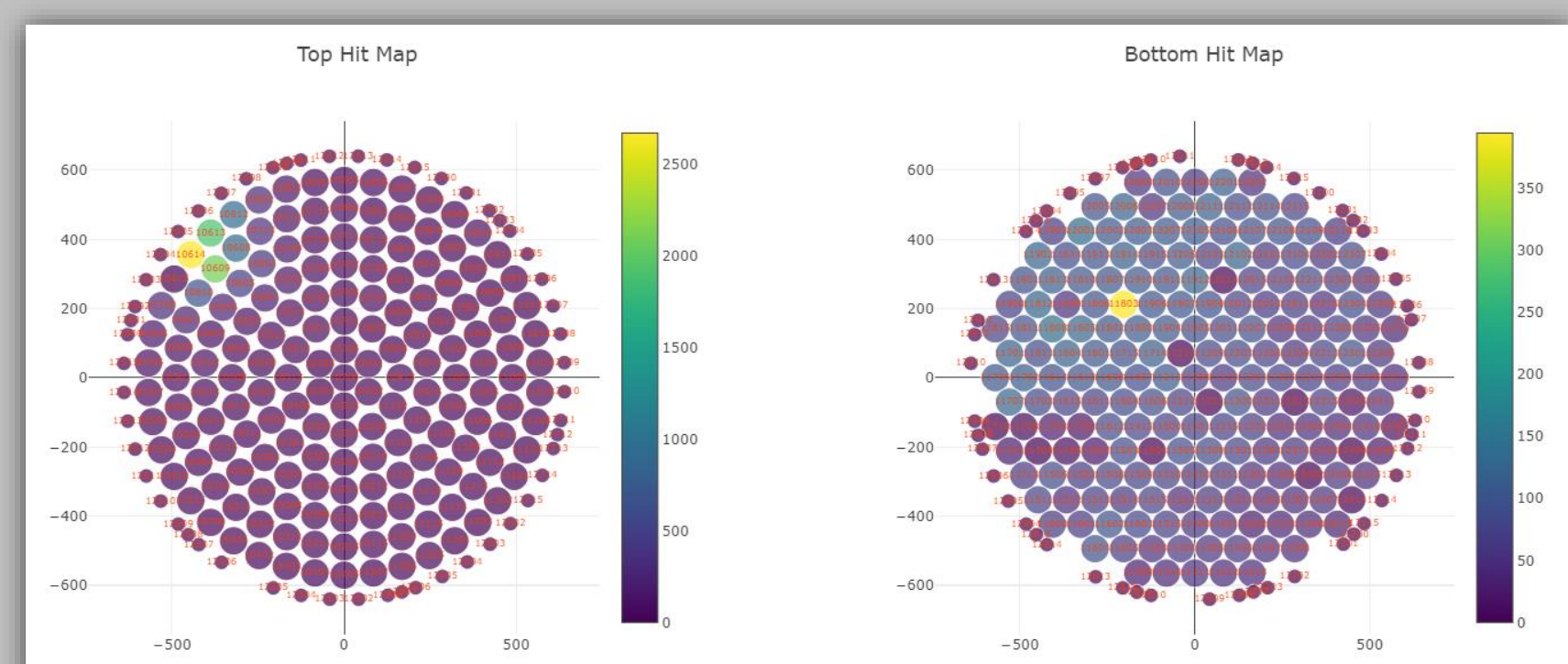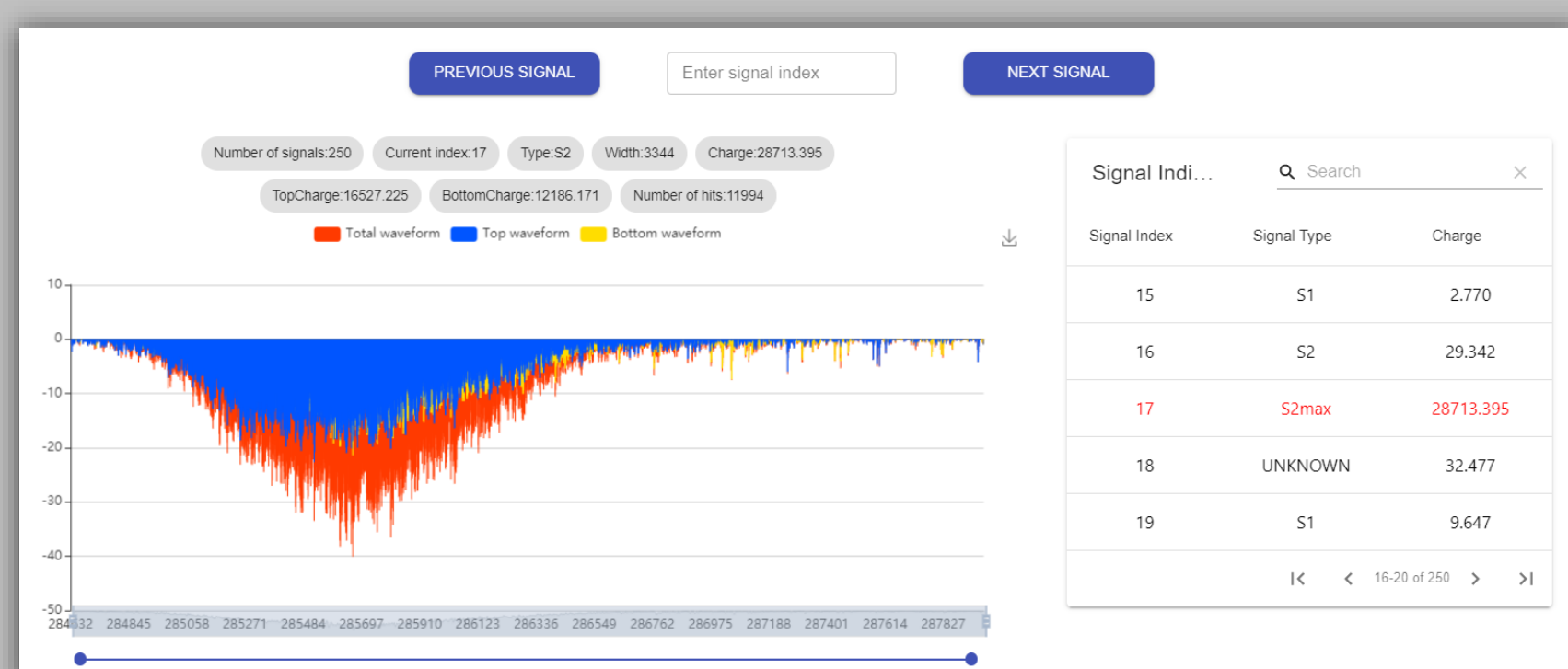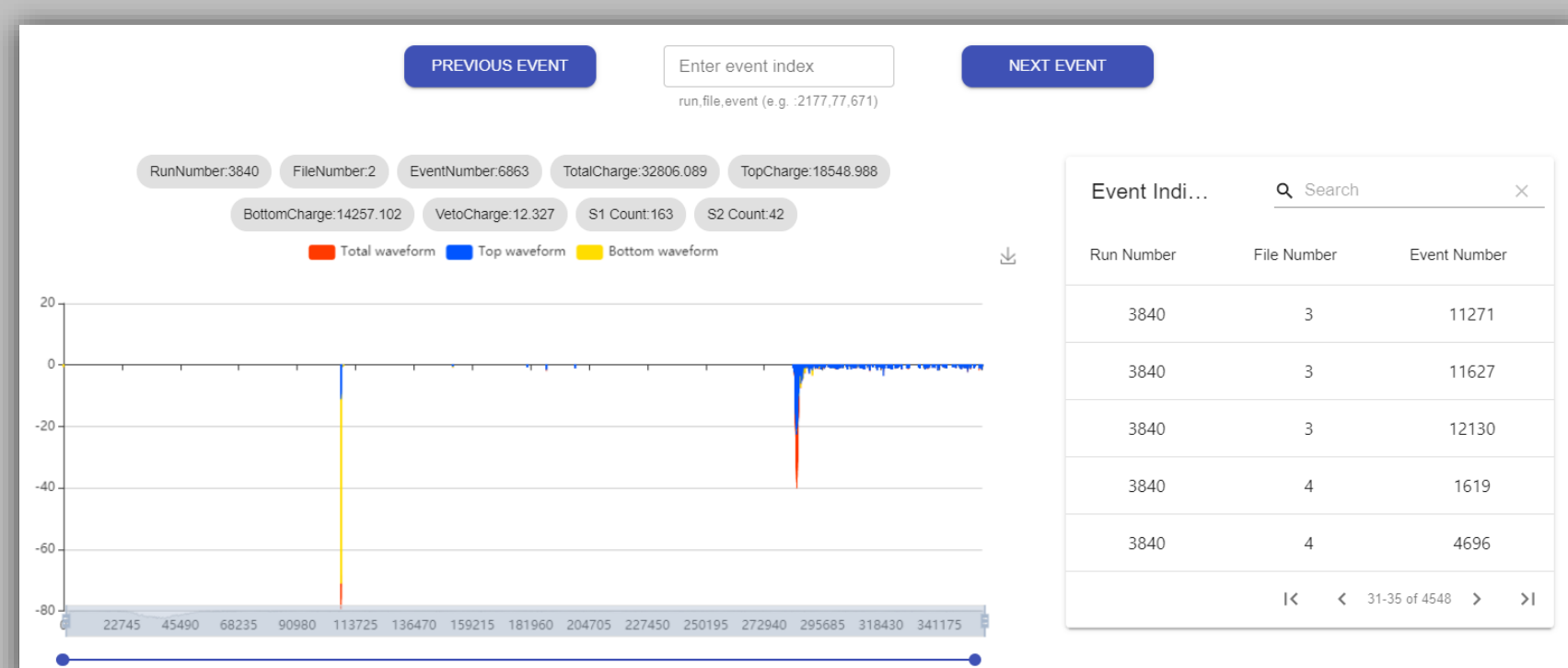
Issues and demands

- ➢ Constant viewing of waveform and PMT signal pattern in daily data analysis.
- ➢ Reduction of dynamic change of events on PMT signal pattern.
- ➢ Robust, static, inflexible usage of ROOT and other plotting library.
- ➢ Complex script coding to style figure.
- ➢ Many other shortcoming …

Software architecture

- ➢ The tool is running on the client-server mode, separated into frontend and backend. They are connected via SSH port mapping.
- ➢ Frontend:
  - • React is component-based JavaScript modern frontend library created by Facebook.
  - • Electron is cross-platform framework which allow us to create desktop apps that works on Windows, Mac and Linux.
- ➢ Backend:
  - • Cpp-httplib is a C++11 single-file header-only cross platform HTTP/HTTPS library.
  - • Bamboo Shoot 3 is data serialization used in PandaX data analysis without dependency on ROOT.

Performace

- ➢ All events need to be view can be dumped into single file and view them by clicking Next/Previous button or search by index of events.
- ➢ Waveform can be zoom in/out dynamically with high performance without any lagging or time delaying.
- ➢ Dynamic change on signal or event pattern of PMTs can be observe via dragging of slider below the waveform plot.
- ➢ Basic information of an event are displayed on the top of waveform plot.
- ➢ All signals waveform also can be view same as events. Type and basic info are displayed as same as events.