Last Interlock Investigator LILI

- **PITZ**
- **Interlock System**
- **My project: LILI**
  - **Task**
    - Saving tool
    - Reading & plotting tool (GUI)
  - **Planned tool**
  - **Save tool**
  - **GUI**
  - **Next Steps**

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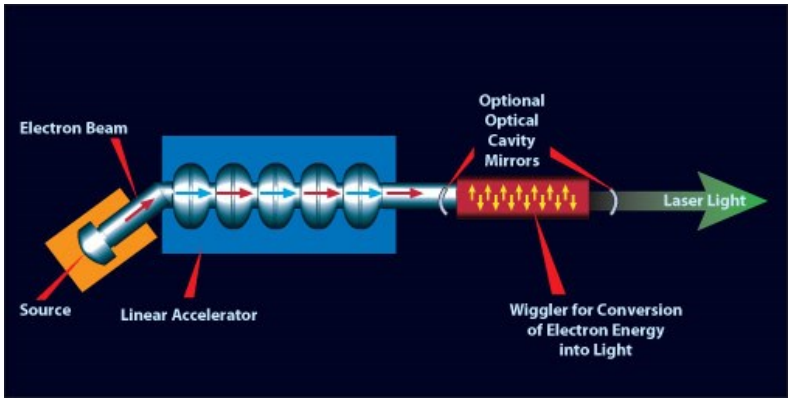
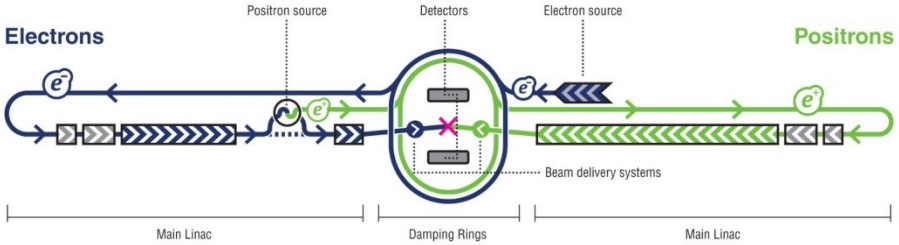
DESY

Photo Injector Test Facility, Zeuthen: PITZ

- **Goal**: optimise sources of high brightness electron beams for FELs and LCs.
- Small transverse (and relatively small longitudinal) emittance.
- Design, characterise and optimise.

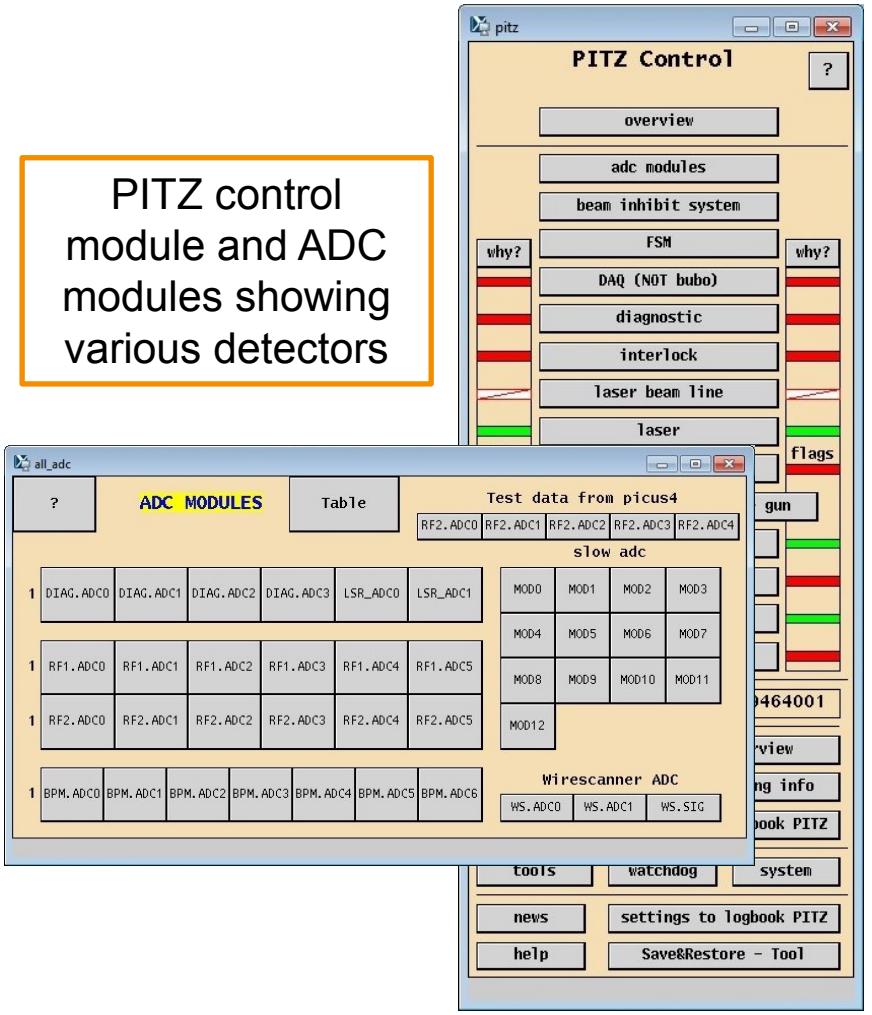




Interlock System

- **Protects accelerator from damage.**
- Also protects users and is designed to identify problems.
- Pulls data from various diagnostics.
- Each IL event must be investigated.
- **Time consuming!**
- LILI, designed to make this process easier.

PITZ control module and ADC modules showing various detectors



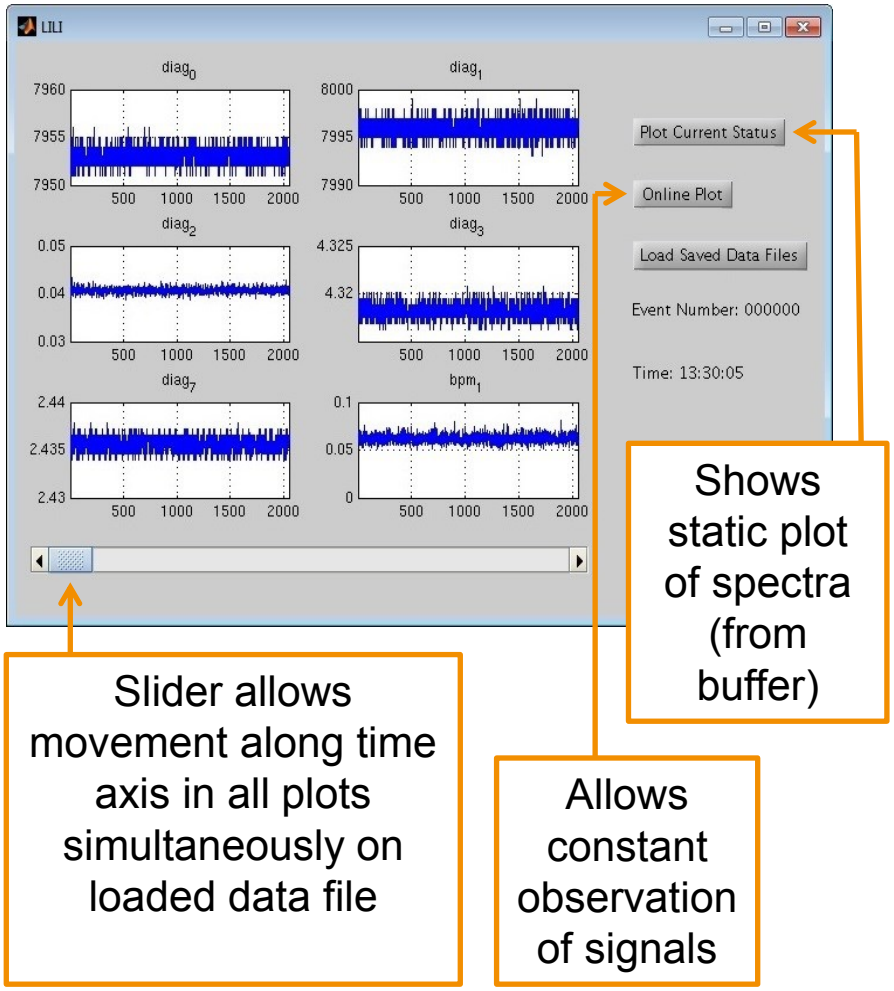
Last Interlock Investigator LILI: Planned Task

> Save Tool

- First saving spectra to buffer, then to file.
- Two methods:
  1. Constant save to buffer -> dump to file
  2. Online save tool analyses signals for spikes and only saves data around event.

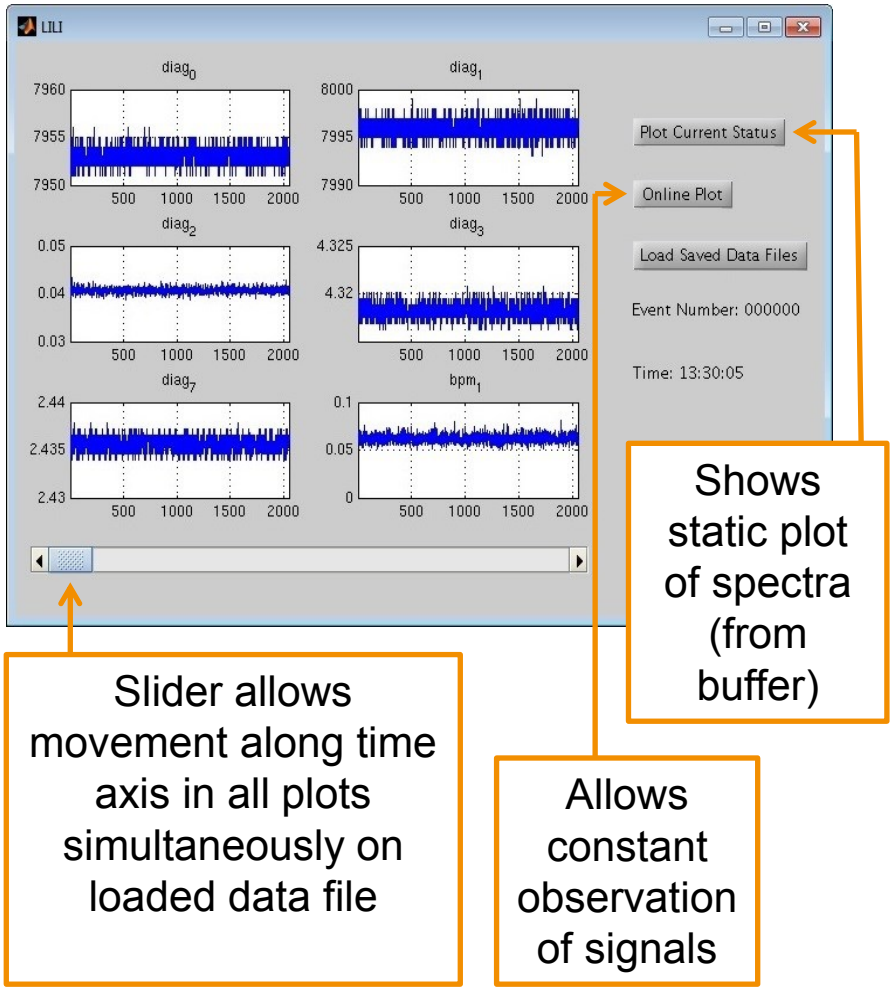
> Read Tool & Plotting

- GUI

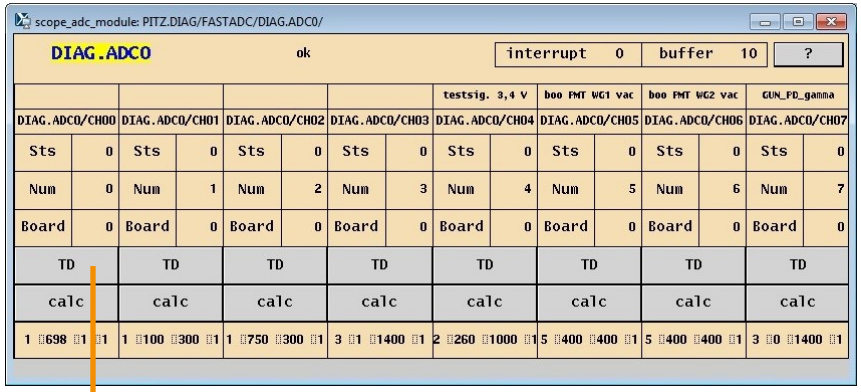


Last Interlock Investigator LILI: Planned Task

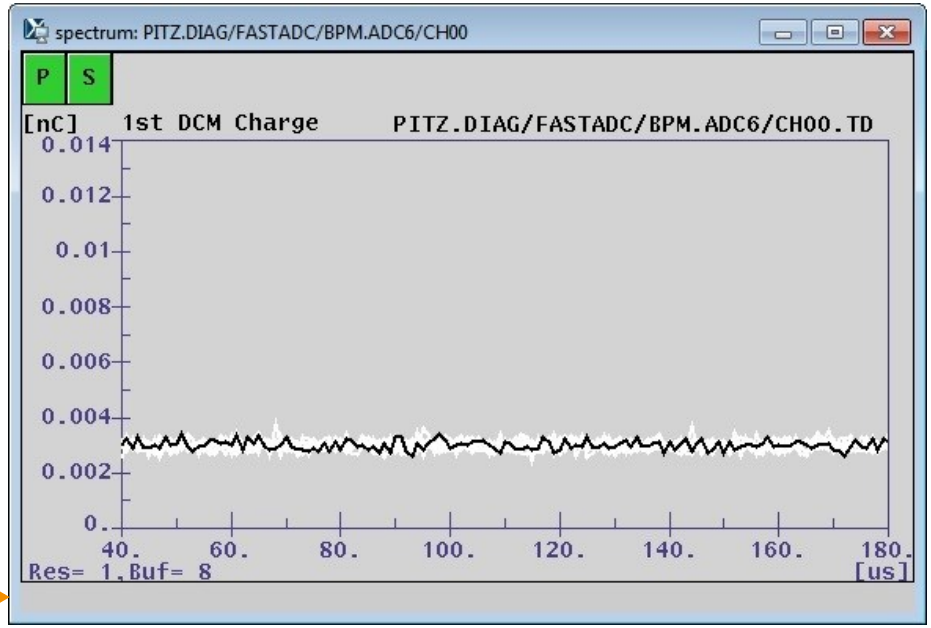
- **Speed prioritised.**
- In timeframe, only first save tool completed.
- GUI modified for further functionality.



LILI: Save Tool

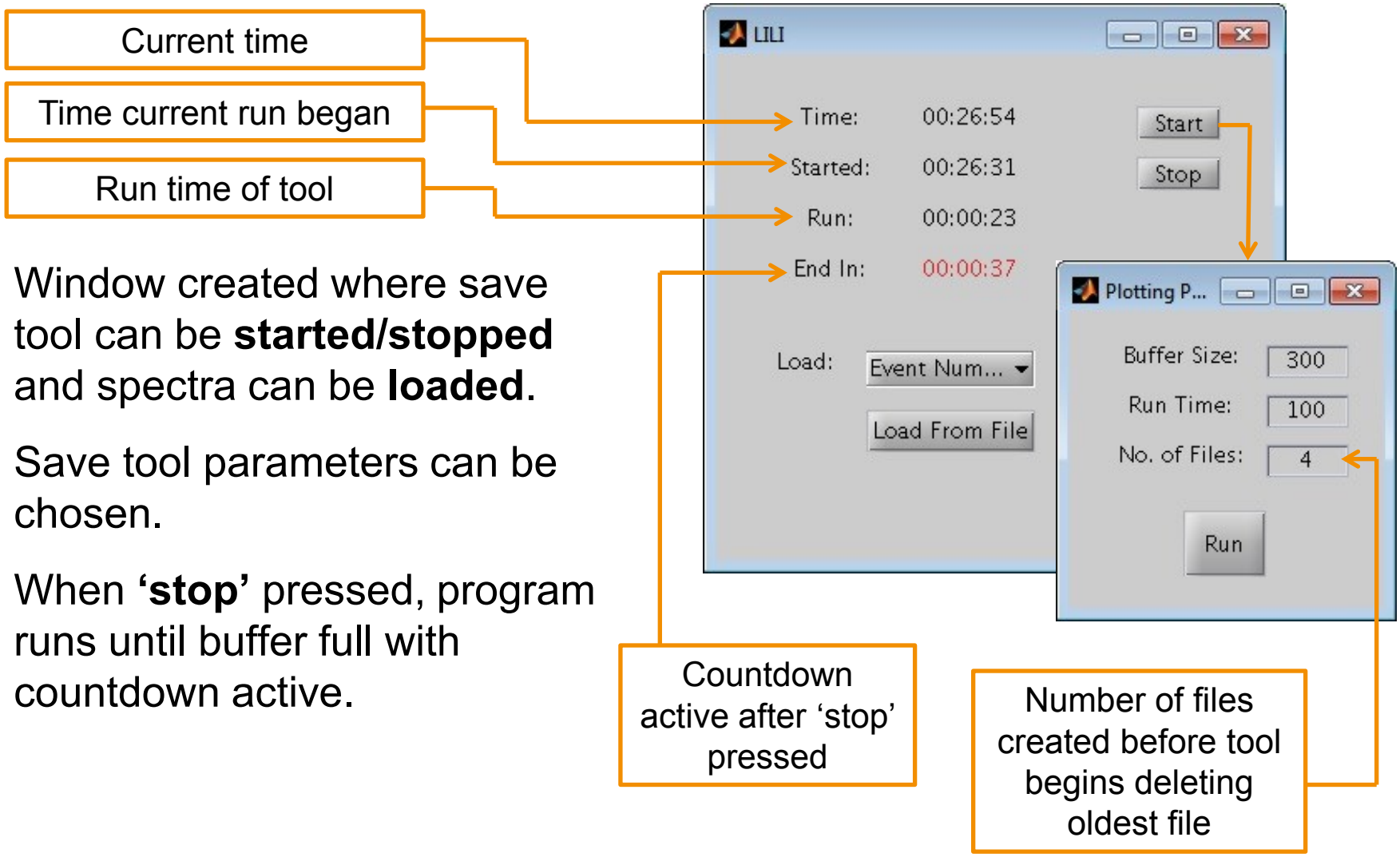


- Spectra loaded into MATLAB using DOOCS addresses.
- Buffer created to store spectra.
- Spectra loaded at 10 Hz frequency.
- Data saved to time-stamped file when buffer full and oldest file deleted.



Noise spectrum from a beam position monitor

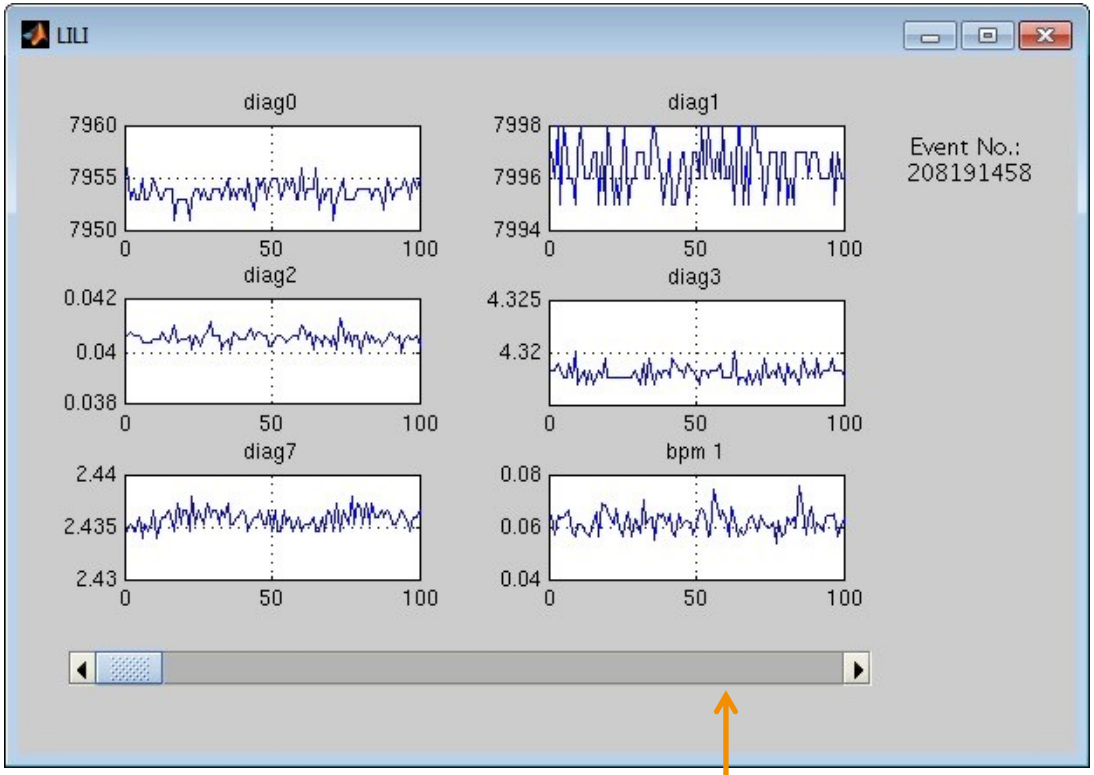
LILI: GUI



- Window created where save tool can be **started/stopped** and spectra can be **loaded**.
- Save tool parameters can be chosen.
- When '**stop**' pressed, program runs until buffer full with countdown active.

LILI: GUI

- Data can be loaded using **event number drop down list** or
- Individual spectra can be **loaded from file.**
- Spectra are plotted in new window with x-axis time-scroll and the event number associated with the spectra displayed.



6 spectra from 6 different ADC addresses, showing zoom of x-axis (0-100, max 2048)

Scroll allows movement along x-axis

LILI: Future Improvements

> Save Tool:

- Second save tool, online and only saving IL events:
- **Two-level threshold** (above and below noise)

  or

- **Signal analyser** (watches for IL spikes).

> GUI:

- Further functionality with second save tool (online plotting, last IL event button).
- More plots from more detectors.
- ‘Stop’ button modification.

Thank you for your attention!