Settings Manager User Guide

Settings Manager → Help → User Guide

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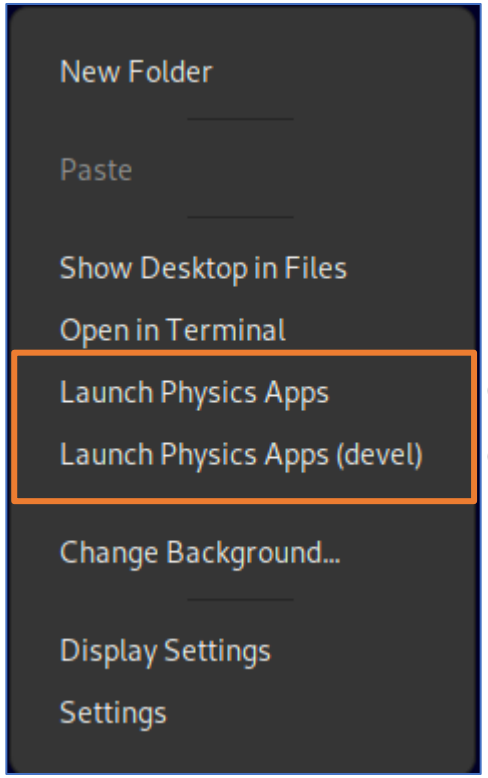
Contents

What is it?

- It is a software application for the data management of physics settings.
- It is one of the applications that is built upon PHANTASY framework.
- Take snapshots of the device settings of an accelerator.
- Load snapshots from database systems.
- Change device settings with loaded snapshots.
- It supports device settings scaling based on different ion species.
- It supports rich features of data sorting, filtering, device state monitoring, and more.
- Accompanied by a collection of Operator Interface (OPI) screens for CS-Studio integration.

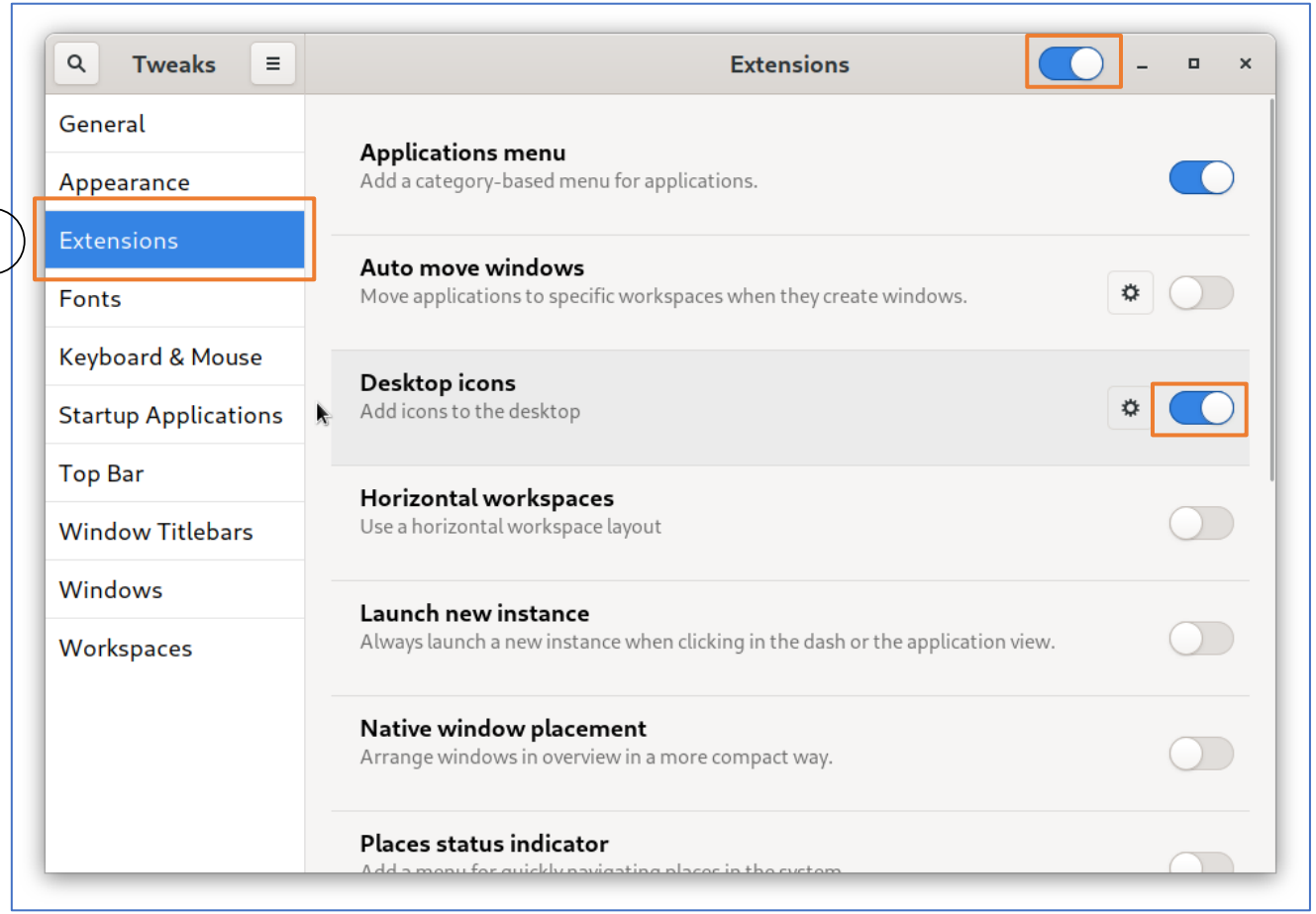
How to start it?

- All physics applications are managed in an app called “App Launcher”
- Each app is presented as one clickable ‘card’ in “App Launcher”
- To have “App Launcher” show up:
  - Right-clicking on the Desktop
  - Select “*Launch Physics Apps*” menu ①
    - *Launch Physics Apps (devel)* is for AP group only ②
  - If cannot see this menu, see next page

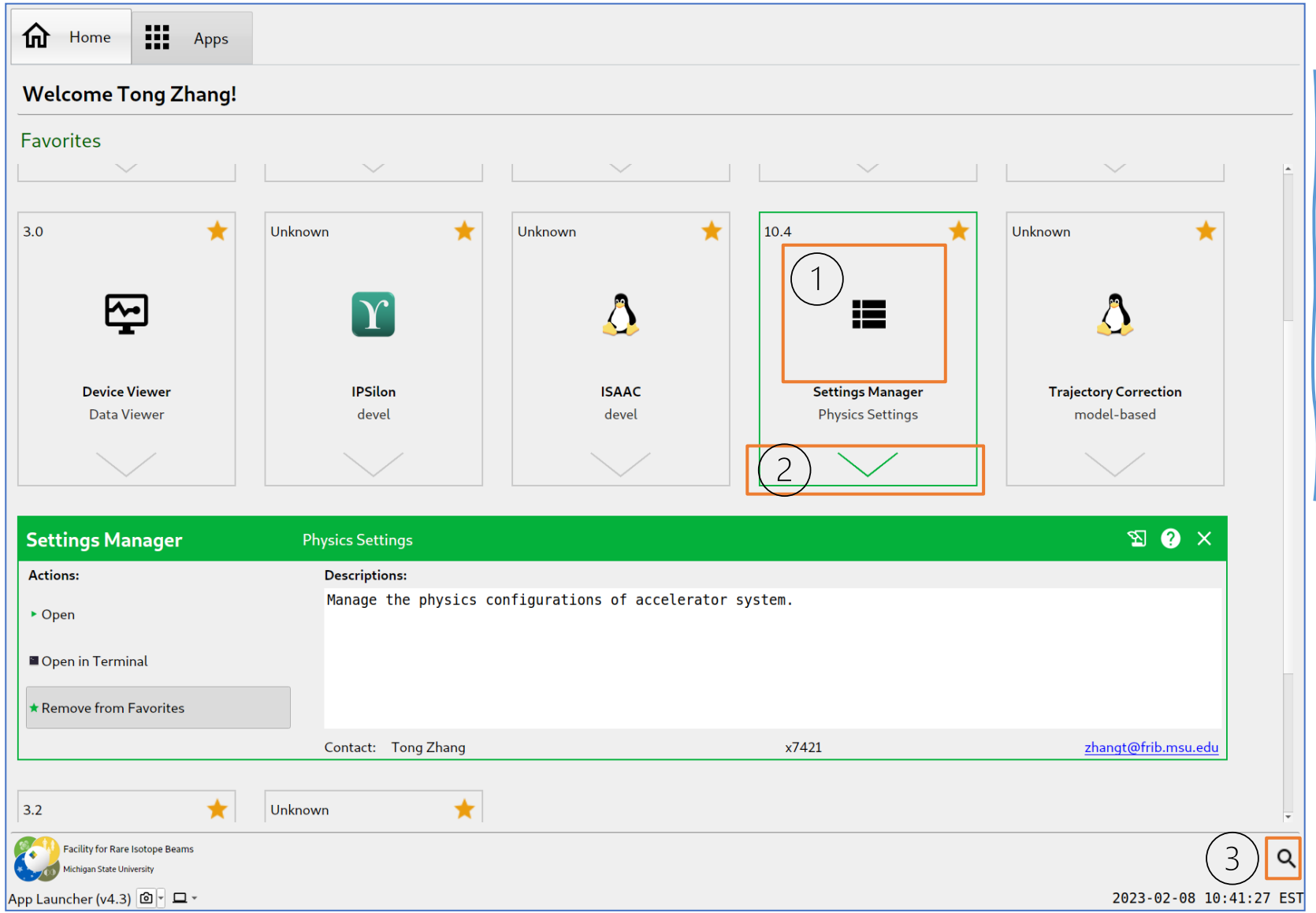


How to enable “Desktop Icons” extension?

- Enable “Desktop Icons” extension to have right-clicking context menu work on GNOME desktop
- Start “Tweak” app, either by searching “tweak” or start from the system menu
- Enable *Desktop icons* in the Extensions tab. (1)

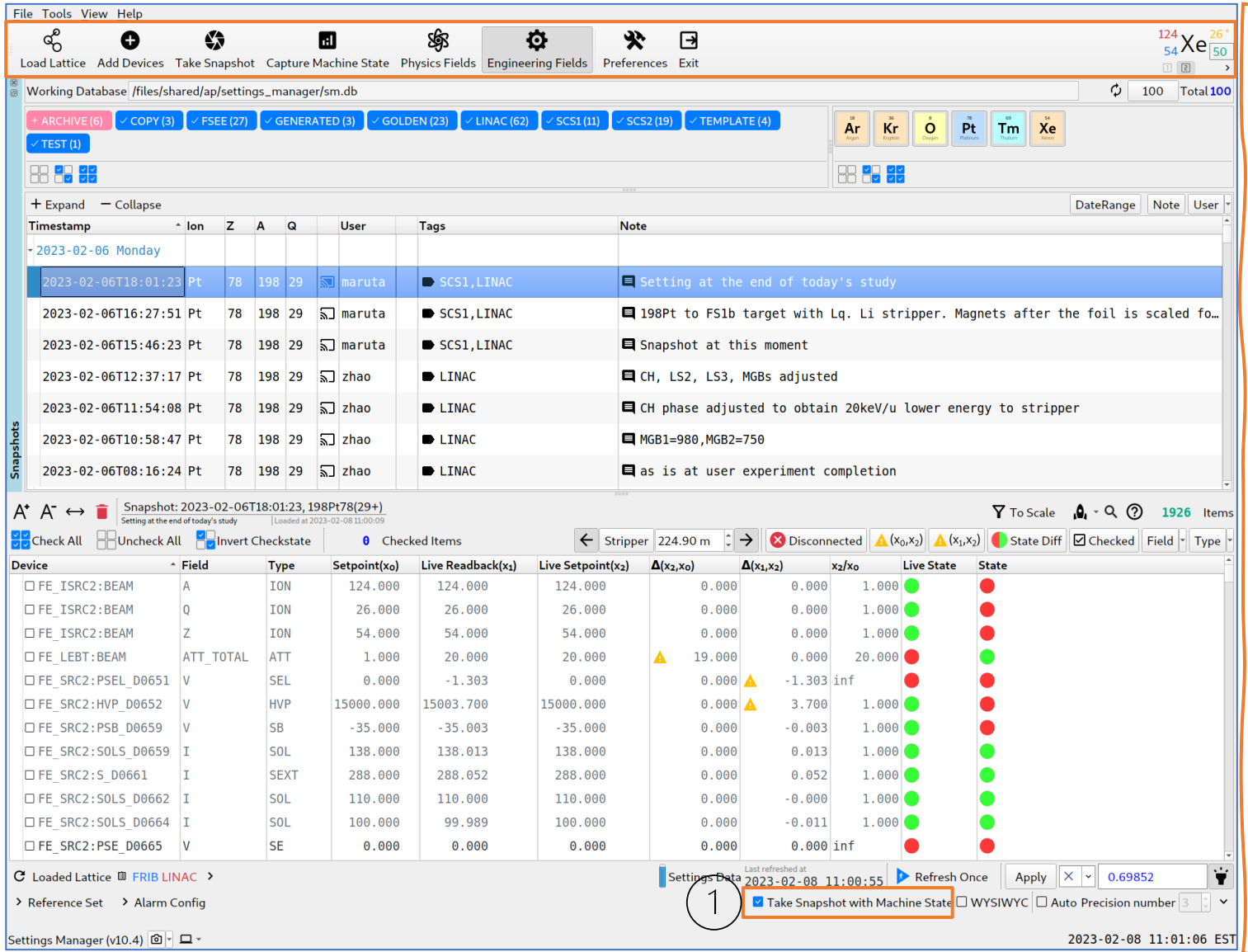


App Launcher: A Global App Manager



- Start by **single-clicking** the app card (1)
- Click the ▾ to expand the (2) detailed info:
  - Description
  - Contact
  - Help documents if available
  - Start up options
  - Others…
- Search apps by CTRL + F, or click 🔍 (3)

Settings Manager: Main User Interface (1)



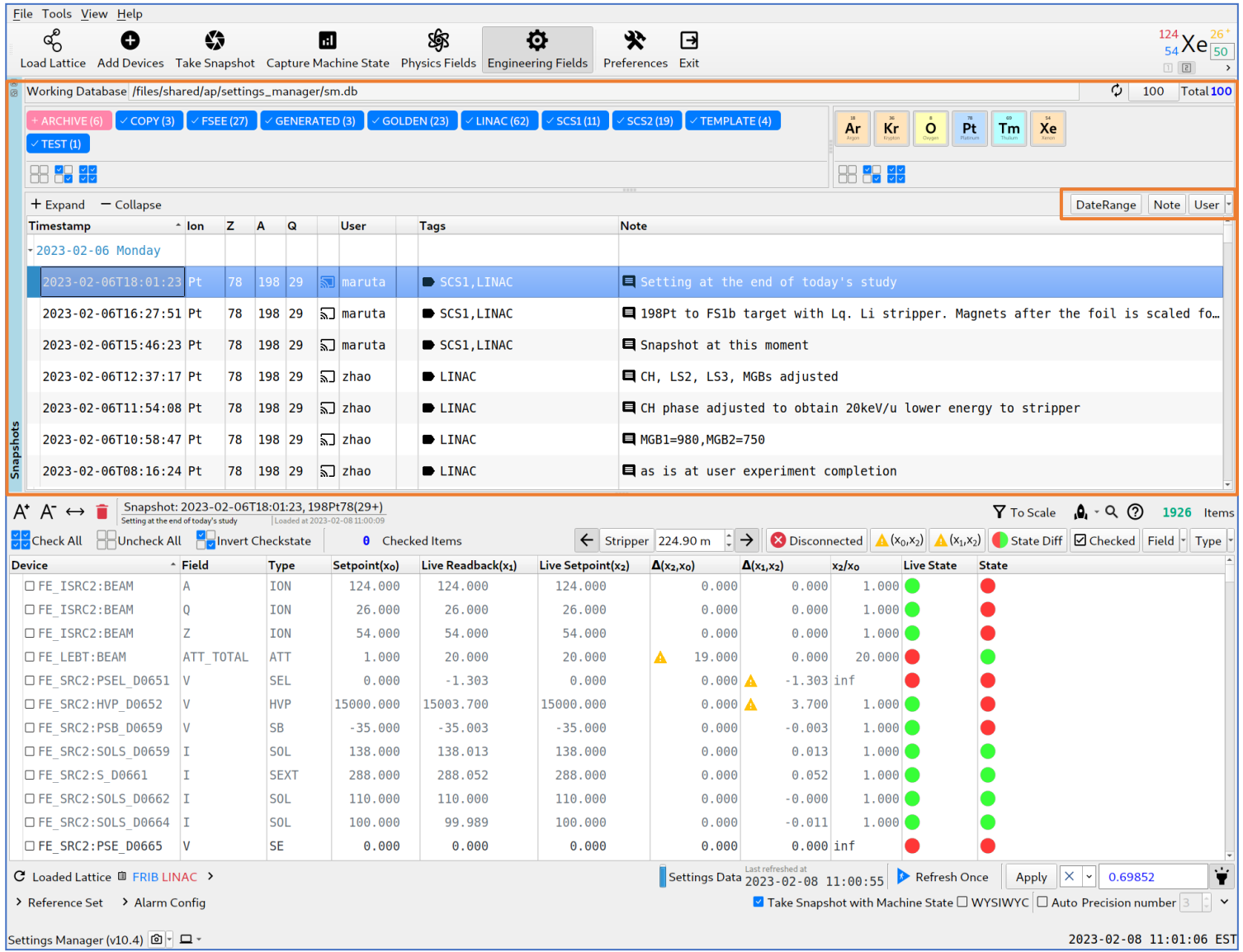
Toolbar Area:

- **Take Snapshot**: Capture device settings and machine state data (if *Take Snapshot with Machine State* is checked) (1)
- **Beam info**: Current running beam info, with charge state post stripper
  - Double-clicking to launch the physics calculator
  - Hover on to see the meaning and PVs
  - Auto-switching between 1 (Artemis) and 2 (HP-ECR) to indicate the ECR source in operation

Less used tools:

- **Load Lattice**, **Add Devices**: for creating the snapshot template
- **Capture Machine State**: take machine state data (defined in *Preferences→Machine State*) and/or save it as a file, this is only useful when the machine state data is wanted, otherwise Take Snapshot will always capture the machine state data and keep together with the snapshot record.
- **Physics Fields**: Show also the physics interpretation of the device settings, e.g. B field of a solenoid from the I reading, you may see doubled amount the items in the Settings View area.
- **Engineering fields**: Show the engineering value of the device settings.
- Note both physics and engineering data is recorded in a snapshot.

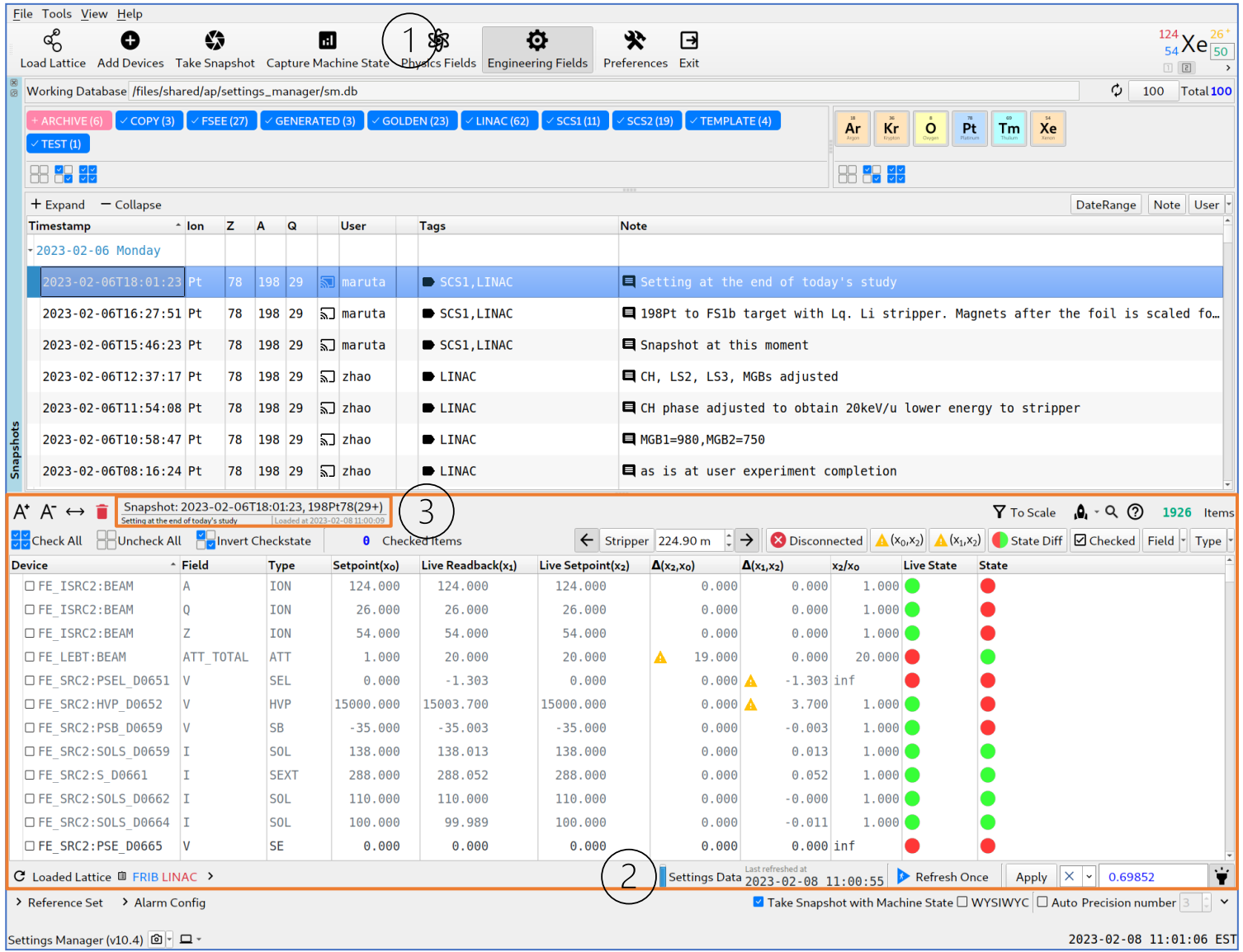
Settings Manager: Main User Interface (2)



Snapshots data area:

- List the entries of snapshots, each row is one snapshot taken at the shown timestamp, with beam species info, tags, user (who created), and note.
- Columns are clickable for sorting
- The loaded one will be indicated with
- Each snapshot could be tagged with multiple tags: words separated by the comma (,)
- Additional information could be put into the Note area
- Only Tags and Note are editable, by double-clicking the cell

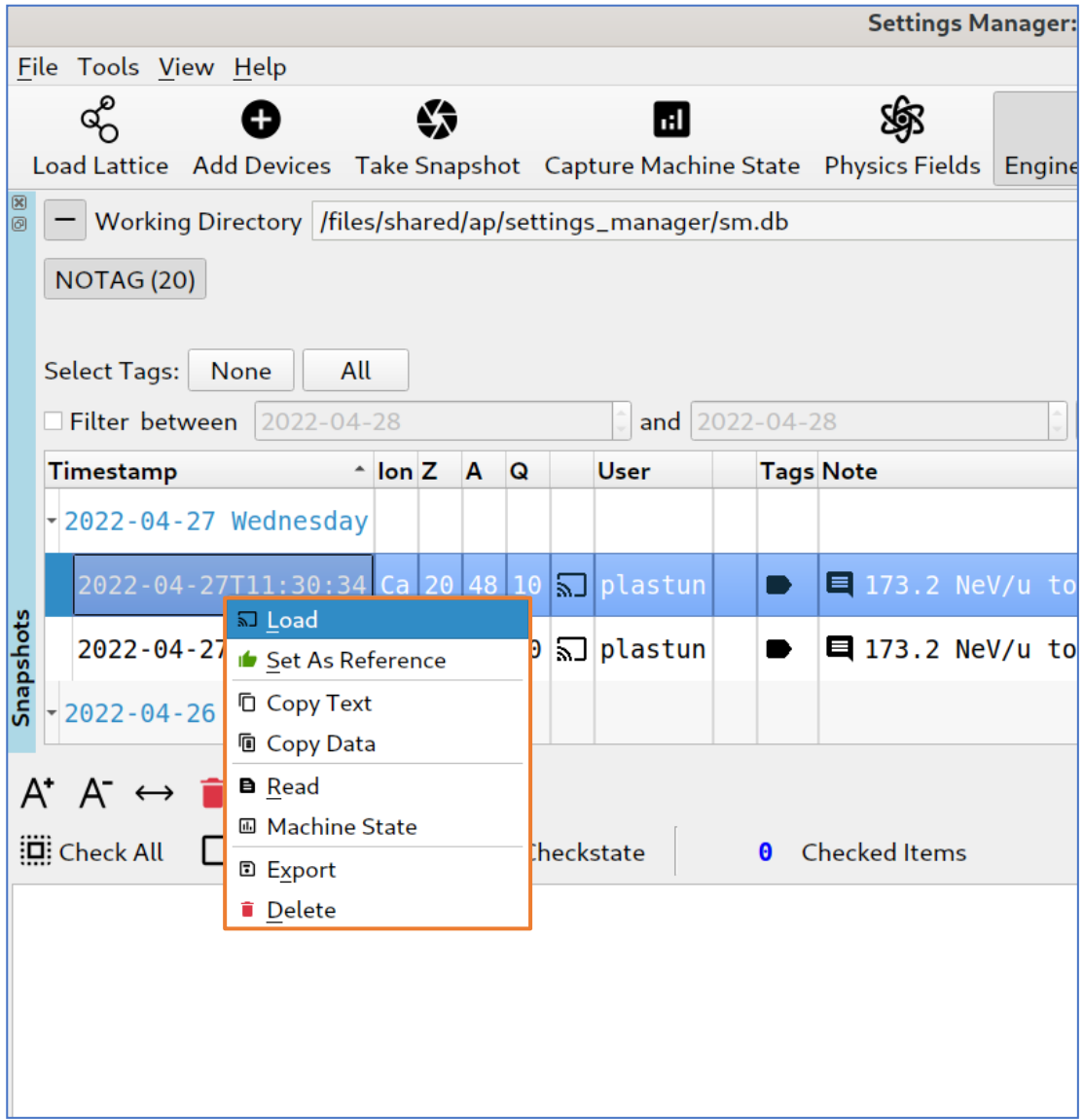
Settings Manager: Main User Interface (3)



Settings view area:

- Table view of the device settings
- Each row is displaying the values for each field (a field is a controllable signal, either in engineering unit or physics (if Physics Fields tool is checked)) (1)
- Rich filter buttons for machine state investigation
- The values are auto-updated at a fixed rate, the updated status could be reading from the vertical bar left next to “Settings Data” (2)
- The loaded snapshot info is posted at (3)

Settings Manager: Snapshot Actions



Right-clicking menu on snapshot entry:

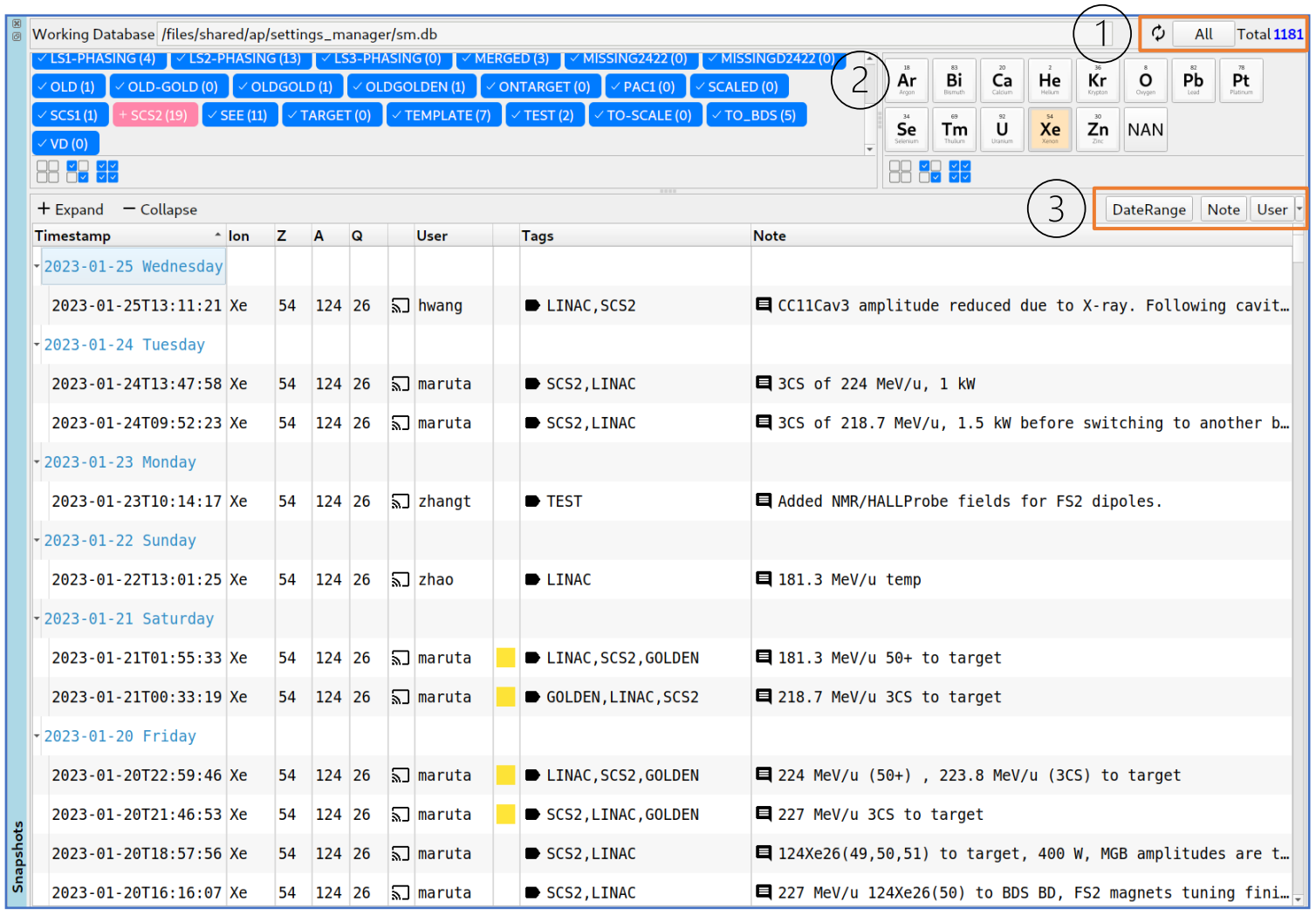
- **Load**: Load the snapshot and present the data into the Settings view area
- **Copy Data**: Copy the table of settings data and could be paste into other apps, e.g., LibreOffice Calc
- **Copy Text**: Copy the text string, e.g., the timestamp string in this screenshot when the mouse is pointing
- **Read**: Open the snapshot in LibreOffice Calc
- **Machine State**: Visualize the machine state if data is stored in the snapshot
- **Export**: Export the table of settings into other file formats, e.g., xlsx, csv, etc.
- **Delete**: Archive the selected snapshot (tagged as 'archive')
- **Set As Reference:** Publish the snapshot as the reference to the control network (See Settings Manager OPI)

1. Double-clicking on the snapshot will load it into Settings View

2. Double-clicking on Tags, Note area will enable editing

- 'Tags' support a string with multiple words that separated with comma (,), do not put spaces. e.g., put the string 'test1,test2' into Tags will tag the snapshot with two tags: 'test1' and 'test2'.

Settings Manager: Snapshot Filters



By default, only 20 most recent snapshots are listed, to show more, proceed:

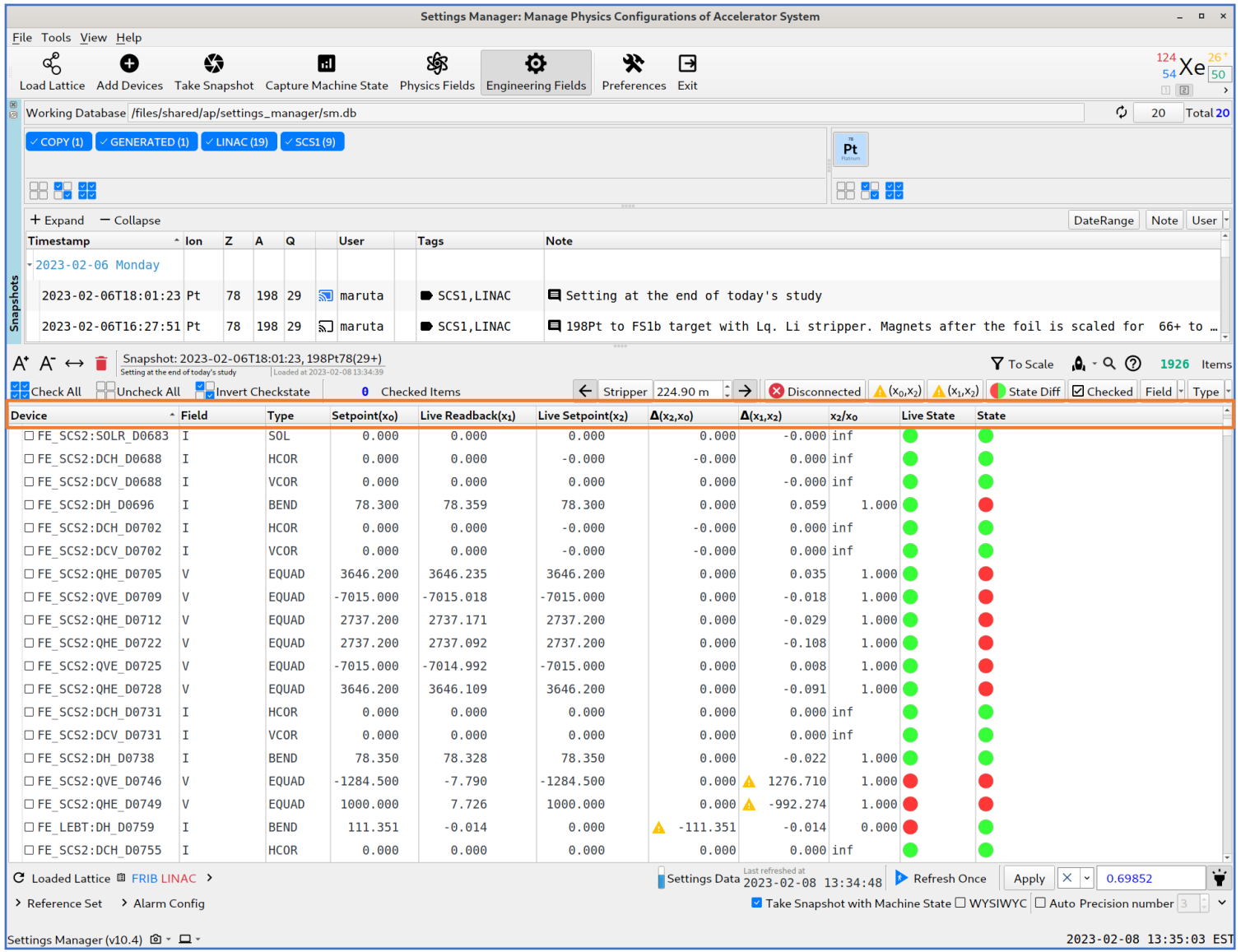
1. Click the button labeled with number, each click will change the displayed number, e.g., from 20 to 50, 100, and All
2. Click to update the snapshot list

Filter buttons: on tags, and ion species names

- Check the filter buttons right after “Select Tags” or “Select Icons” labels to enable the filters.
- By default, all snapshots are listed
- The example of the screenshot shows:
  - Only show “Xe” with “SCS2” tagged snapshots
- Column could also be sorted by clicking
- Support data filtering by date range, note content and username, by checking/unchecking the filter button to enable/disable searching

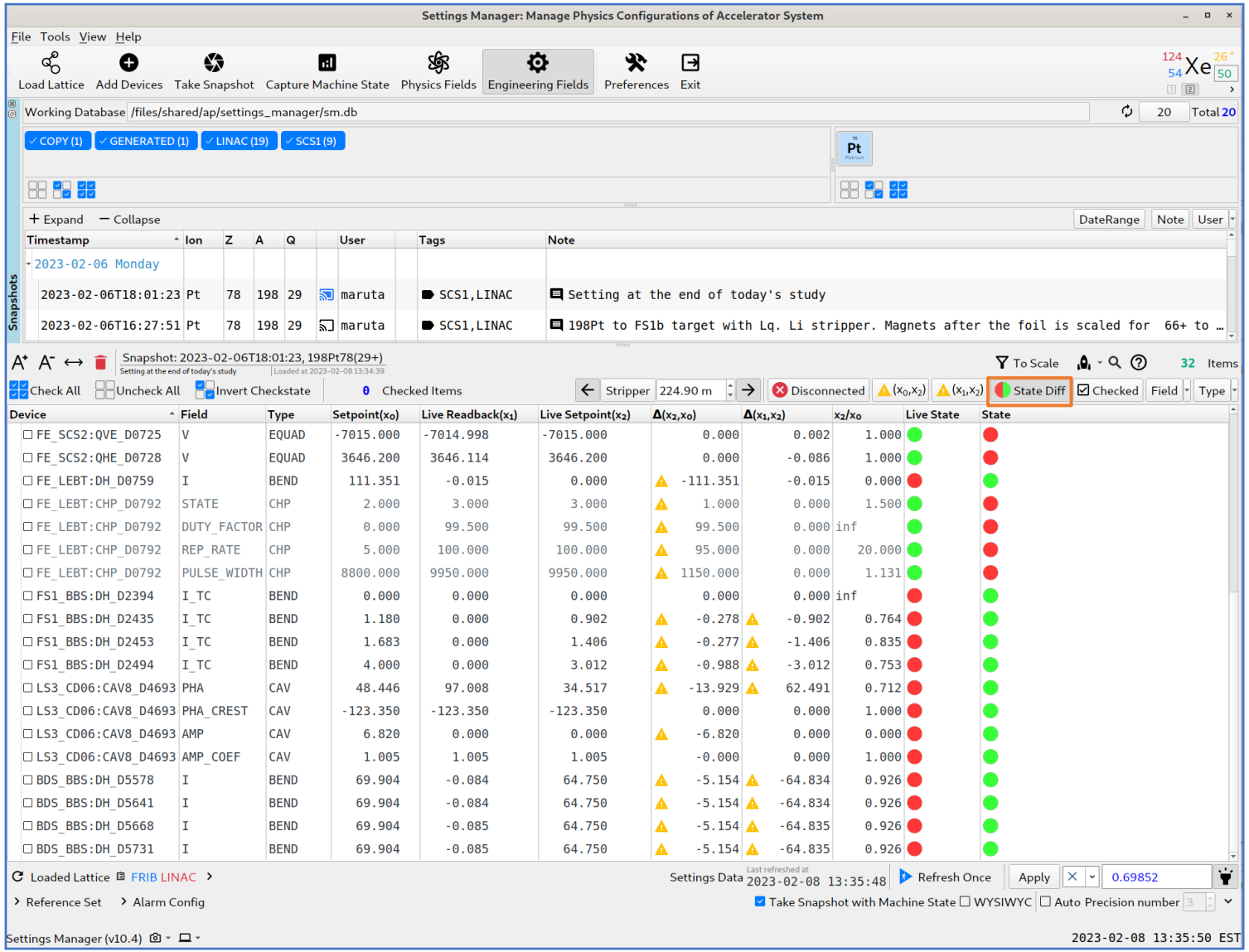
Select None
Invert Selection
Select All

Settings Manager: Settings View



- **Device**: name of the device, by default sorted by the device global s-position ascendingly
- **Field**: name of the controllable attribute, e.g., I of FE_SCS2:DCH_D0688 means the current of this horizontal corrector, all the values in right columns are for this field
- **Type**: device type, e.g., SOL is solenoid, HCOR is horizontal corrector, QUAD is magnetic quadrupole, etc.
- **Setpoint(x_0)**: saved setpoint values, i.e., the live setpoints when the snapshot was captured
- **Live Readback(x_1)**: live readback values
- **Live Setpoint(x_2)**: live setpoint values
- **$\Delta(x_2,x_0)$**: x_2-x_0, how diff of current set and last saved one
- **$\Delta(x_1,x_2)$**: x_1-x_2, how diff of current read and set
- **x_2/x_0**: the ratio of current set and saved one
- **Live State**: current device state indicator
- **State**: last saved device state indicator

Settings Manager: Investigate Settings (1)



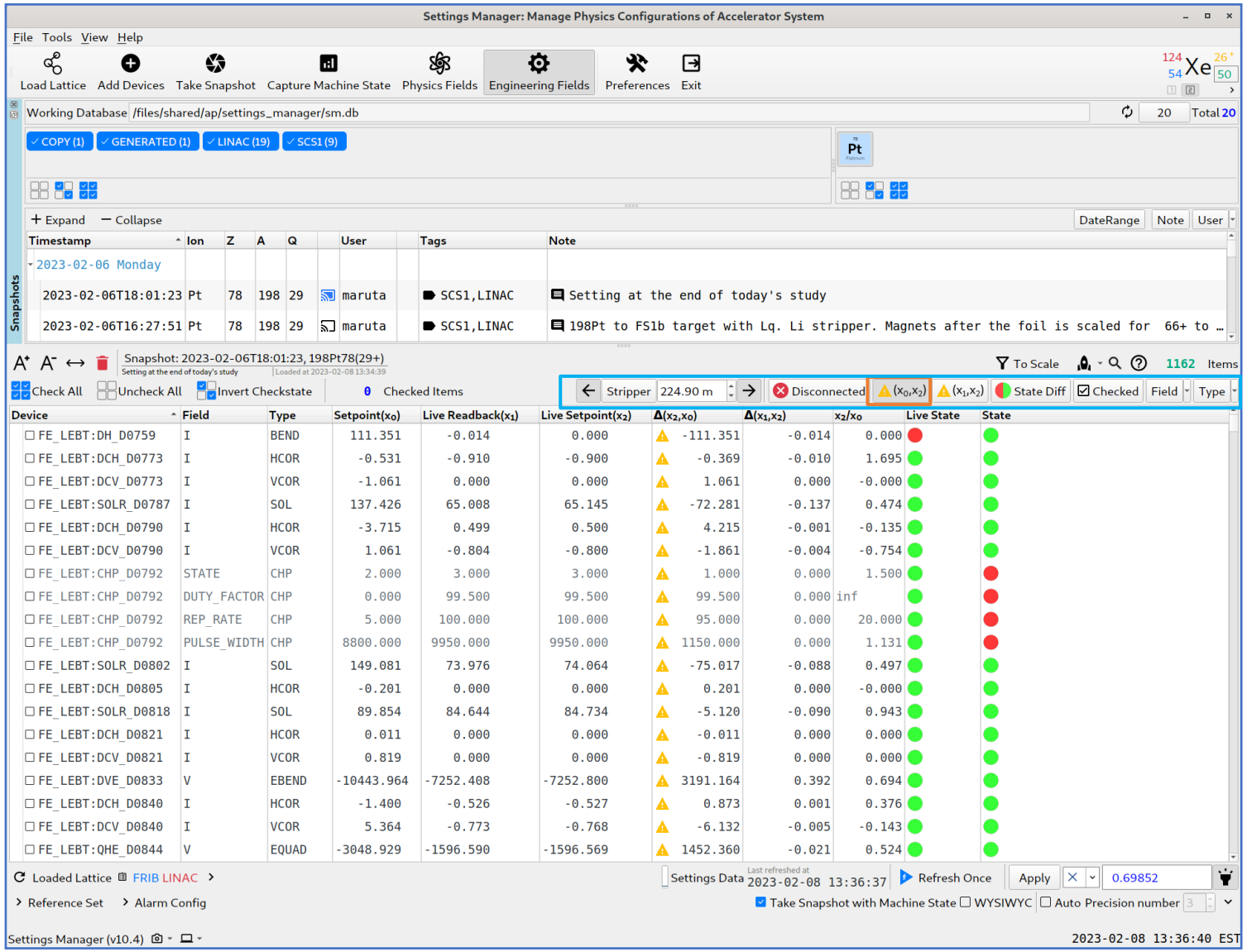
State Diff Filter out the items that meet:
Current device state is not the same as last saved one.

Normally, Red 🔴 means the device is powered off, Green 🟢 is for powered on; for SRF cavities, Red is phase unlocked, green is phase locked.

Extended device state indicator:

- 🔴 Red state indicates the device is either intercepting or blocking the beam, e.g., chopper, aperture, attenuator, etc.
- 🟢 Green state indicates the reverse state of red state
- 🔵 Blue state: only for chopper ‘off’ state
- 🟤 Brown sate: only for chopper ‘invalid input’ state

Settings Manager: Investigate Settings (2)



(x0,x2) Filter out the items that meet:
Current live set values are different from the ones that last saved, i.e., only list items with different x_2 and x_0, or non-zero $\Delta(x_2,x_0)$.

The same applies to (x1,x2), and other filter buttons in blue highlighted area.

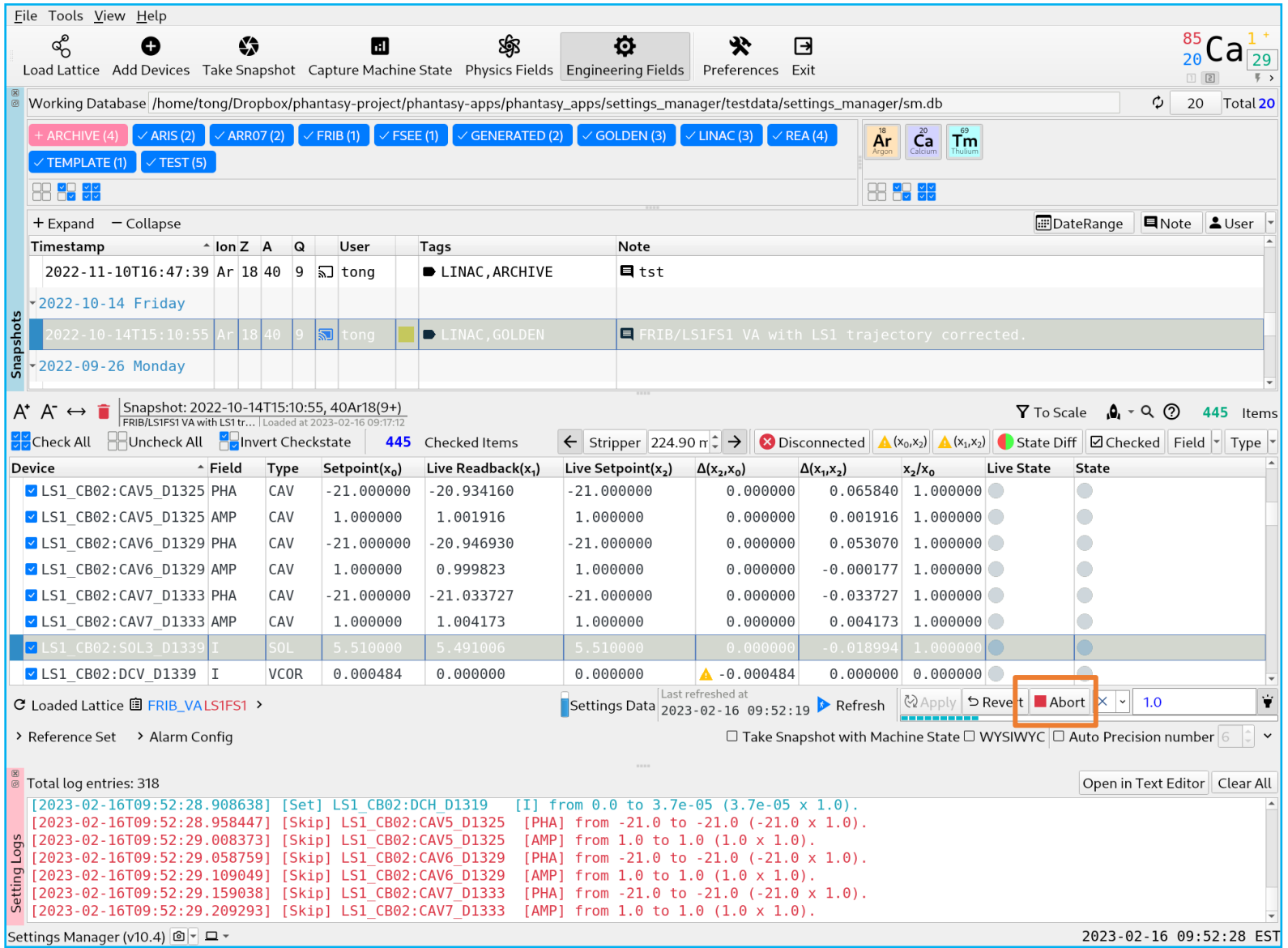
Tips:

- Hover on the button for the hint (brief help).
- General search feature, see 🔍 and ⓘ
  - e.g., input ‘FE’ will only show the device name contains ‘FE’.

Settings Manager: Change Machine Settings

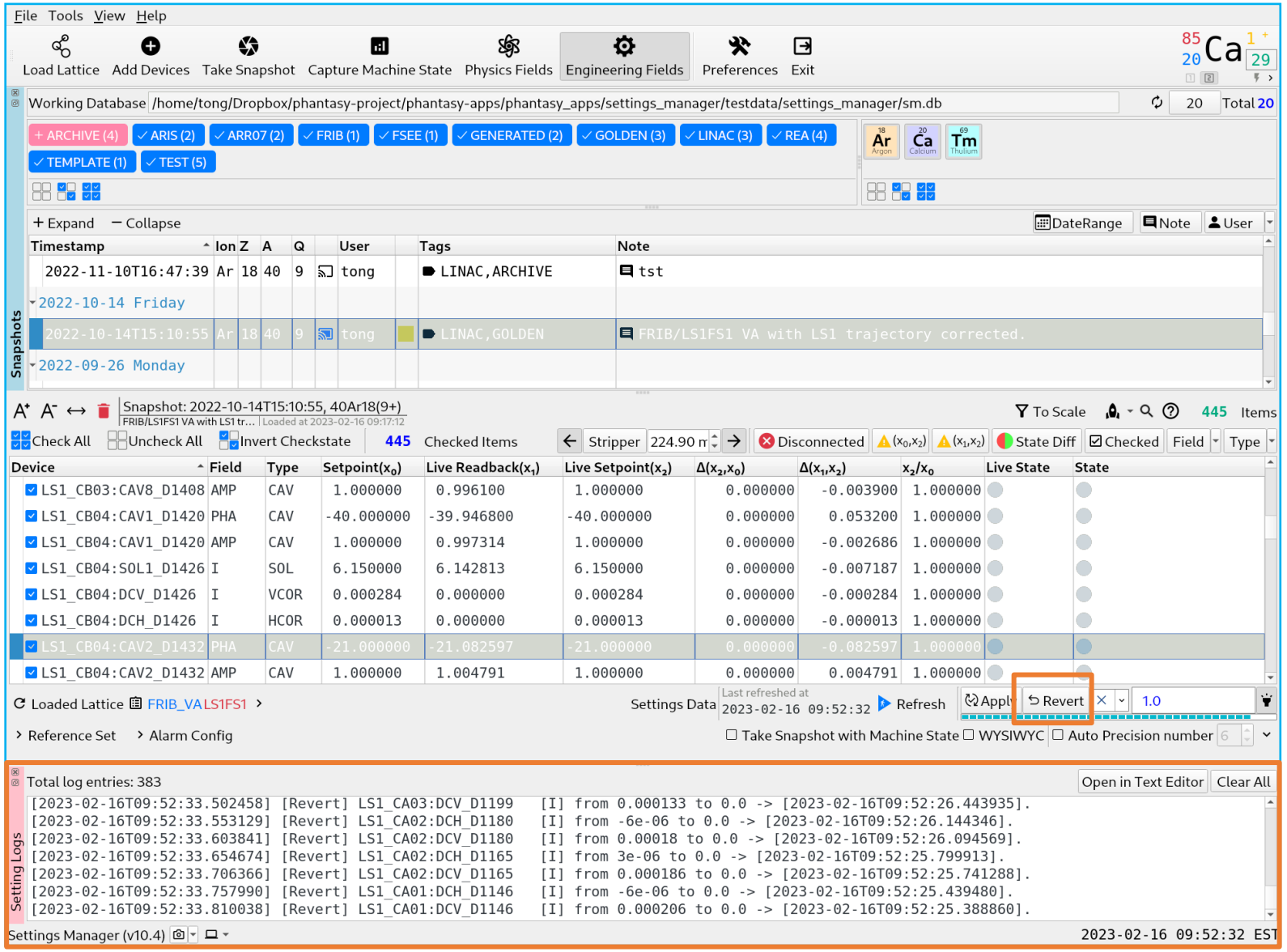
- After loaded one snapshot, the user is ready to change the machine settings by ‘Apply’ operation (see the ‘Apply’ button at the right bottom area)
- **Only checked items** will be put into the ‘Apply’ list
  - The setting log could be seen in settings log, right-clicking empty toolbar area to enable it
- How to check items:
  - Click the button Check All will check all items that allowed to control
    - Non-writable items are gray colored, which is largely based on channel access permission
  - Double-click on the device item will check/uncheck the item
  - Supports working with CTRL and SHIFT for multiple selections (not yet check)
    - To check selected items, right-click on the selection area, and follow the menu guide to check/uncheck all
  - To see all checked items, click Checked filter button
- Click ‘Apply’ button to set the device with the data in x_0 column, if scaling factor rather than 1.0 is used, the real set values are scaling factor times x_0
  - Click the filter button To Scale to list the items that good for scaling (contact AP if needed)

Apply Settings



- The Apply button will be ready to click only when there are checked items in the current page
- The Abort button will be valid to terminate the apply procedure once it is ongoing

Revert Settings: Undo Last Apply



- After each “Apply”, the “Revert” button will be available to revert the device settings that have been changed by the “Apply”, which includes the case that the last Apply procedure is aborted by “Abort”
- The Setting Logs panel could be turned on by right-clicking on the toolbar, and check “Setting Logs”
- From the Setting Logs, one can read every line of device change is either:
  - Skip: no real set
  - Set: set with saved
  - Revert: revert last Set
- Revert only: points when the setting was last changed

Scale Device Settings

- Generally, *scale* is multiplying (x) a factor to the Setpoint (x_0) with which set the device as the new setting; shifting (+) is also supported, meaning apply the device new settings as x_0 + shift amount (the same place where scaling factor is input).
- For scaling operation, only devices with the field name falls into the following list are eligible:
  - I, V, AMP, AMP1, AMP2, AMP3, I_TC
  - Otherwise ignore the non-unity scaling factor
- For shifting operation, all devices are eligible
- After the Apply button is clicked, a warning message with scaling/shifting info is pop-up.

Settings Manager: Take a Snapshot

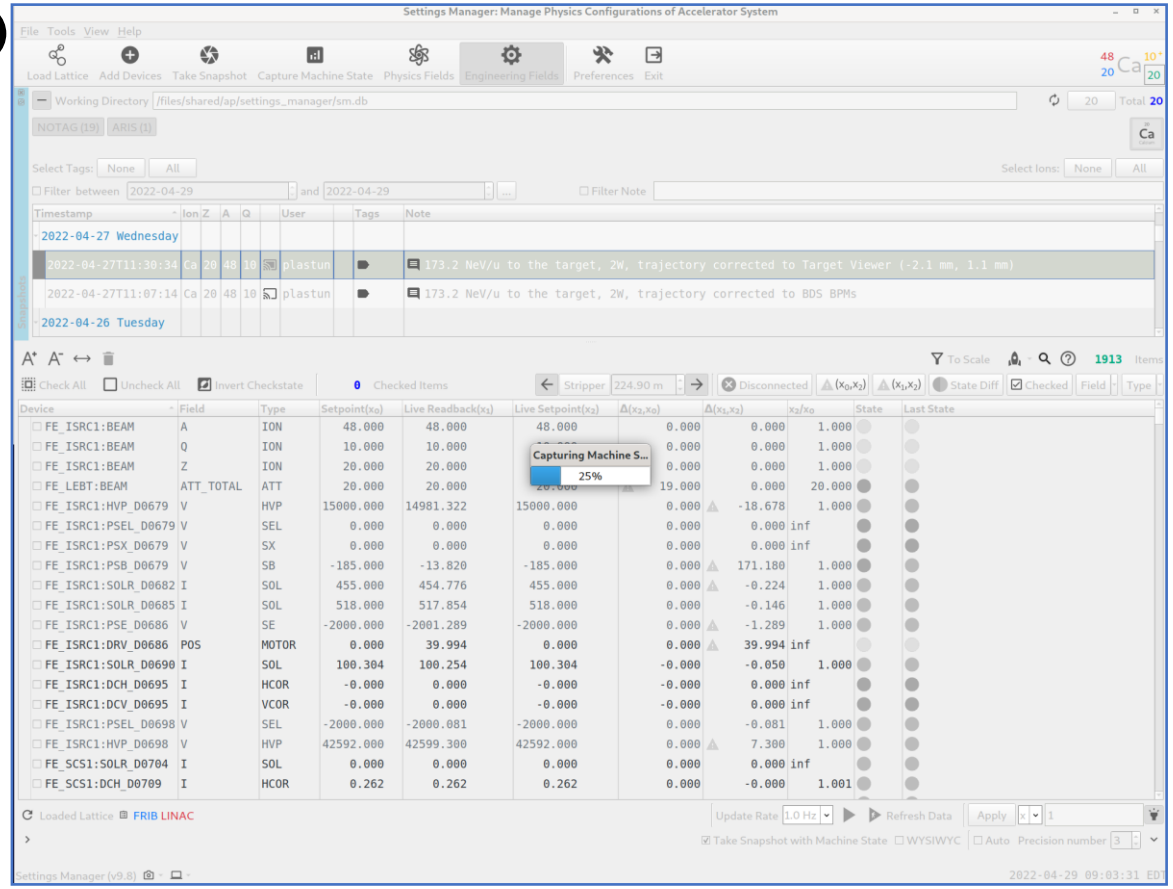
- Click the “Take Snapshot” button in Toolbar area will make a new snapshot, includes:
  - Capture machine state data
  - Capture live physics settings that listed on the Settings view area
    - By default, it will capture the full list of device settings
    - Unless ‘WYSIWYC’ option is enabled (see the checkbox at the bottom area of the main UI)

  - What is WYSIWYC: **W**hat **Y**ou **S**ee **I**s **W**hat **Y**ou **C**apture
    - If enabled, “Take snapshot” will only capture the items that currently show on the page of Settings View, by whatever means to produce the list, e.g., by filtering.
    - This option can be used to make subset of the snapshot for other purposes, e.g., monitoring
    - **Do not forget to turn this option off**, if you want the default take full list of devices settings option back

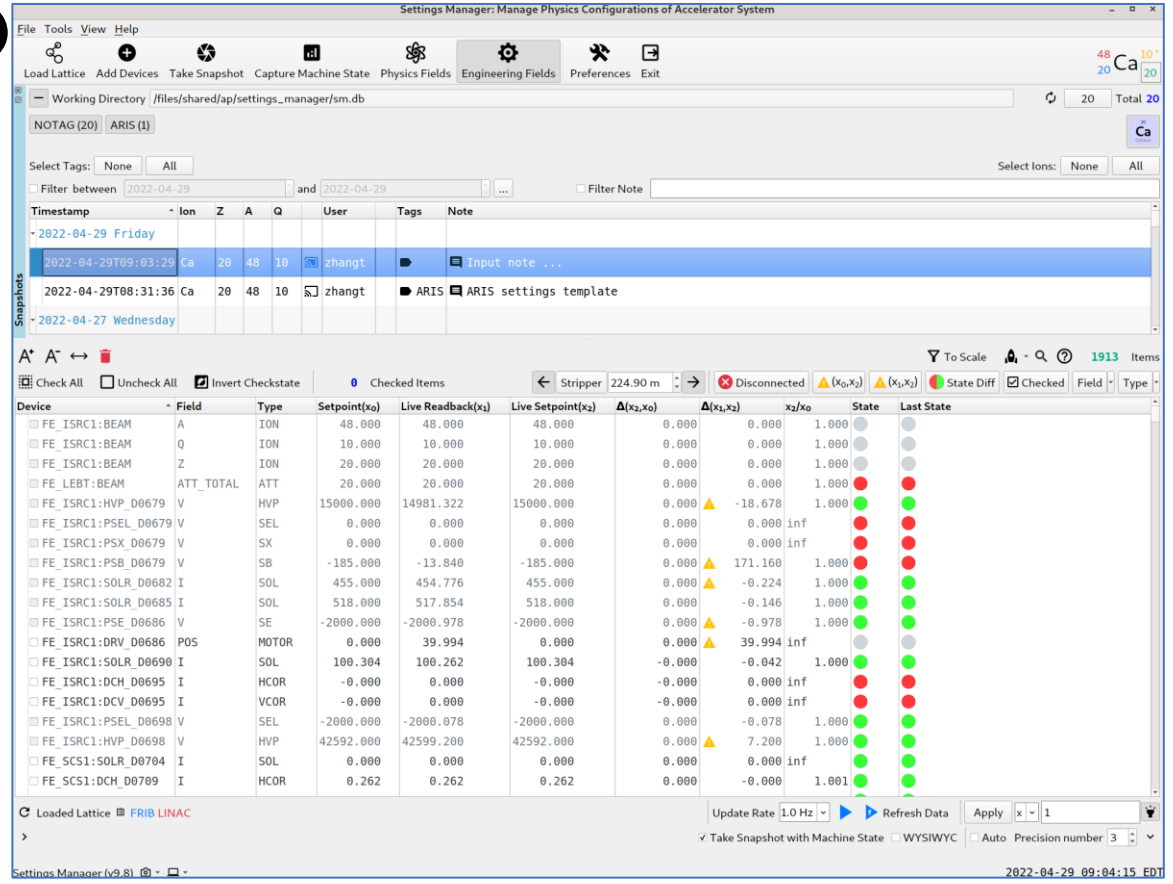
Settings Manager: Capturing a Snapshot

When “Take Snapshot” is hit…

1



2



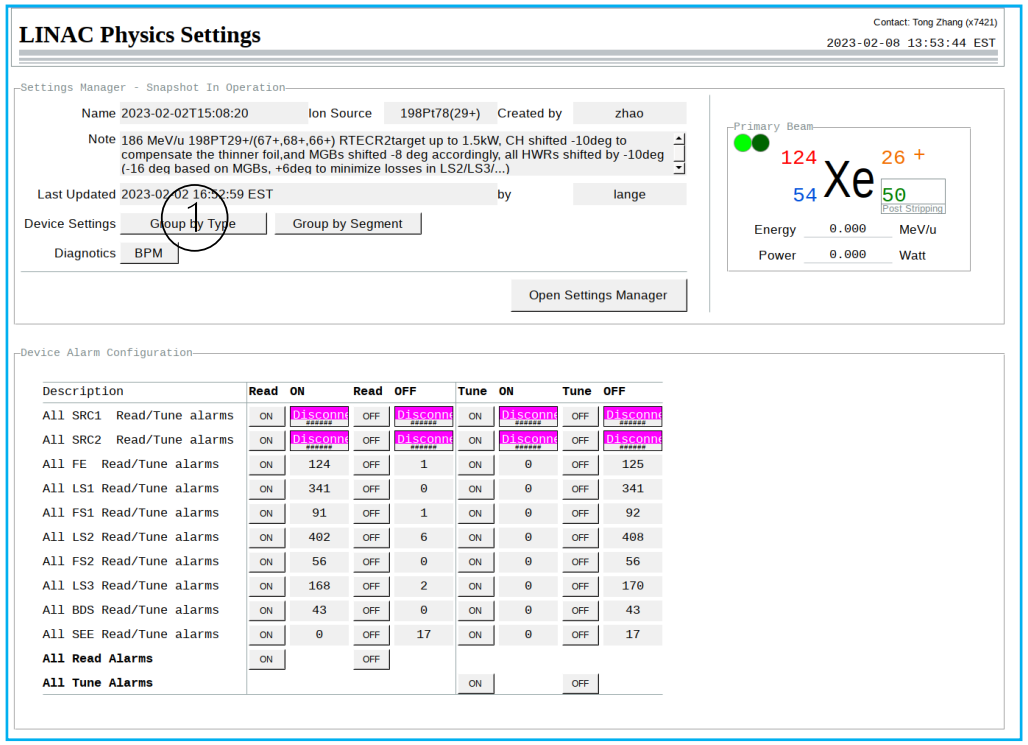
Capturing machine state data, which will be saved together with the snapshot database entry

The current settings view will be replaced with the just captured snapshot, meaning, e.g., clicking filter button like state diff will list nothing, all $\Delta(x_2,x_0)$ should be zero.

OPI Screens for Settings Manager (1)

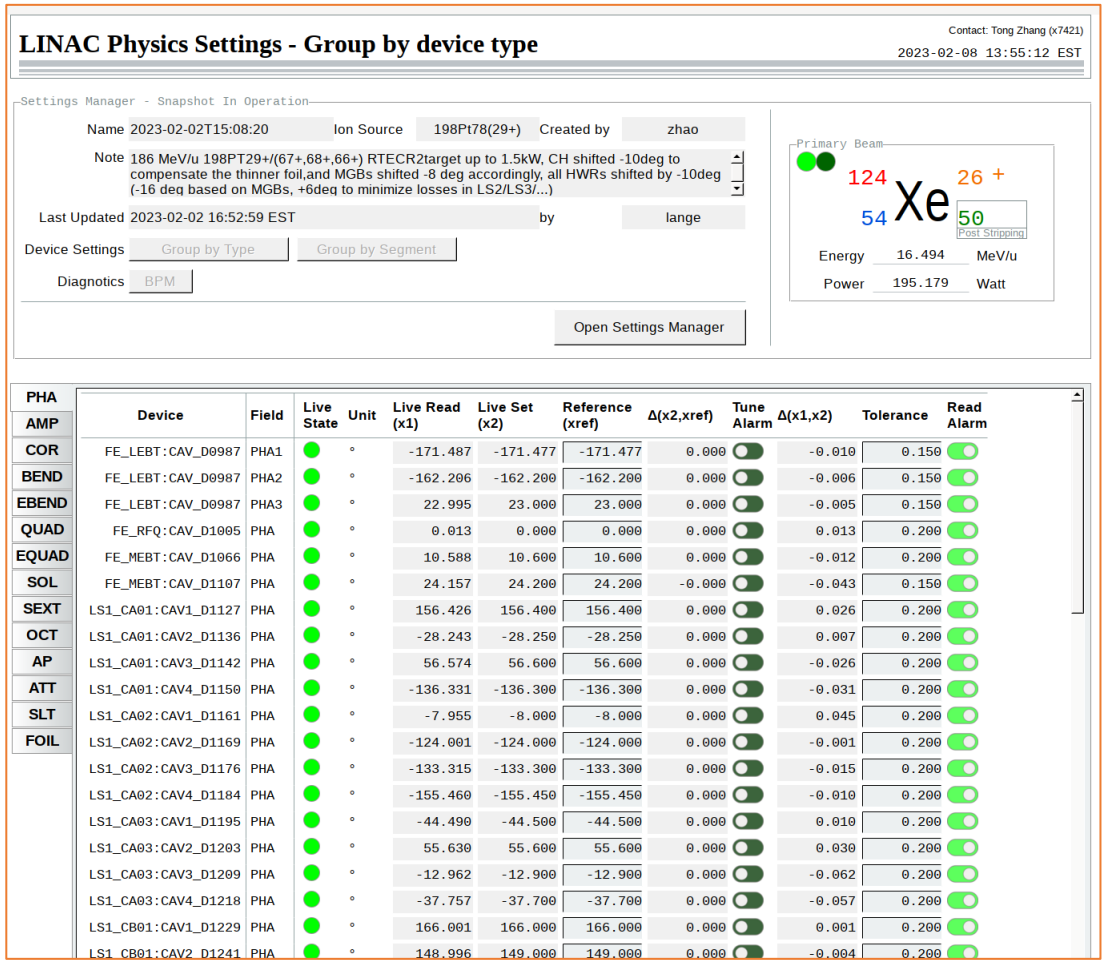
- The OPI screens are developed to integrate all the snapshot information into the CS-Studio, and Phoebus
- The OPI screens are developed for monitoring live values (at least at 1 Hz)
- These OPI screens could be reached both in FTC and Office Network (via ftcextlogin machine)
- Two ways to reach via the CS-Studio menus:
  - FRIB Main → AP → Settings Manager
  - FRIB Main → FE → Settings Manager (under Operator/Global group)

OPI Screens for Settings Manager (2)

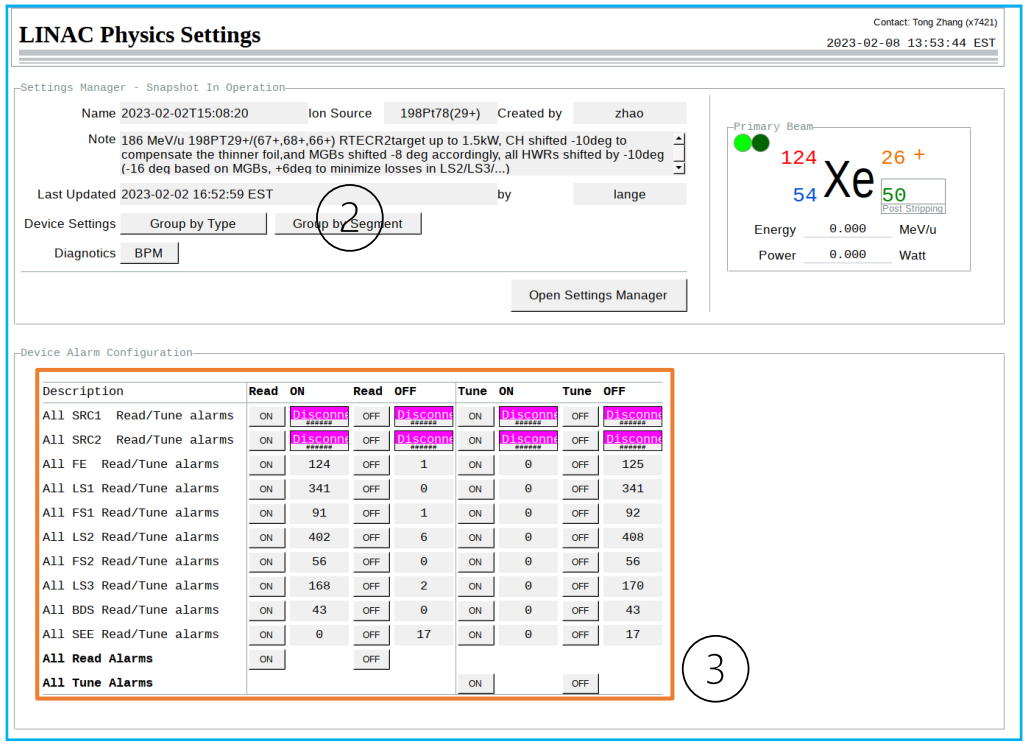


- Overview page for snapshot in operation
- And device settings alarm control

1

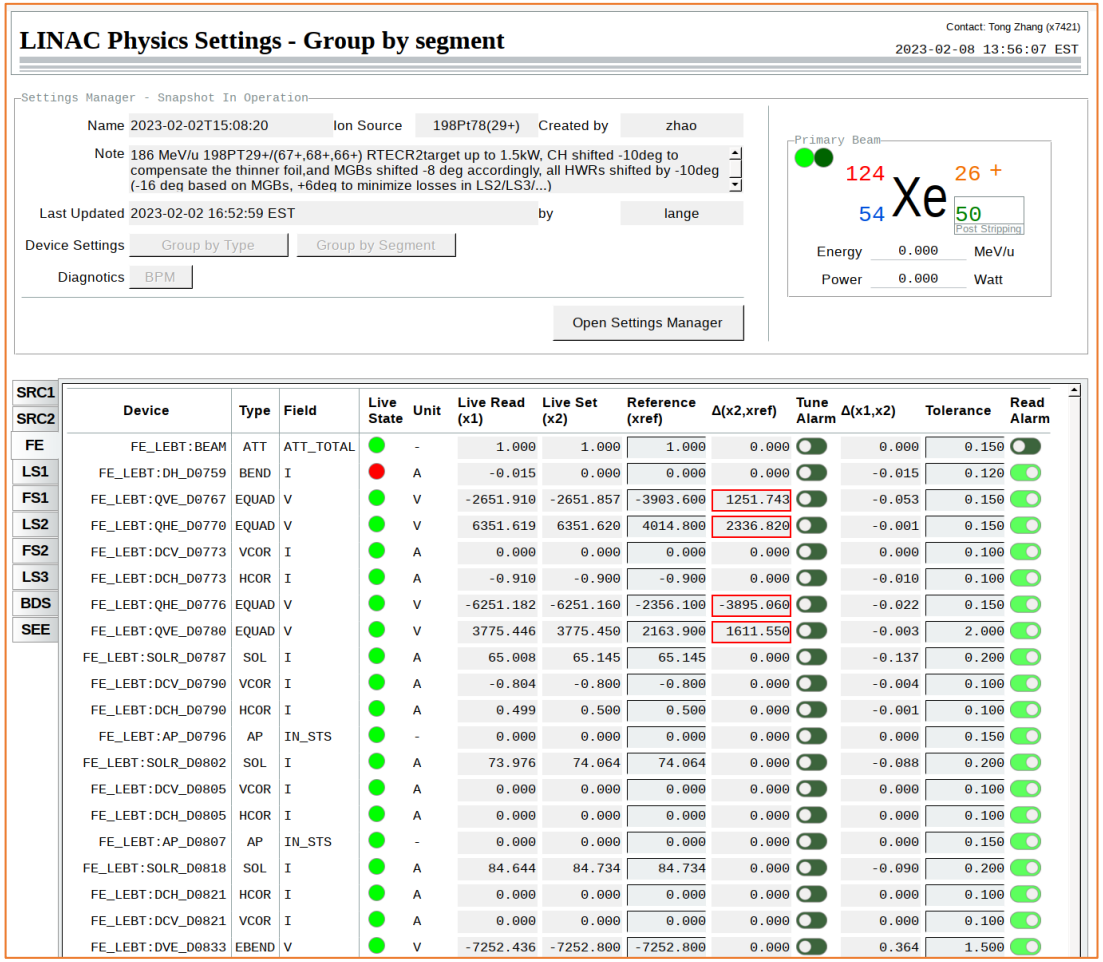


OPI Screens for Settings Manager (2)

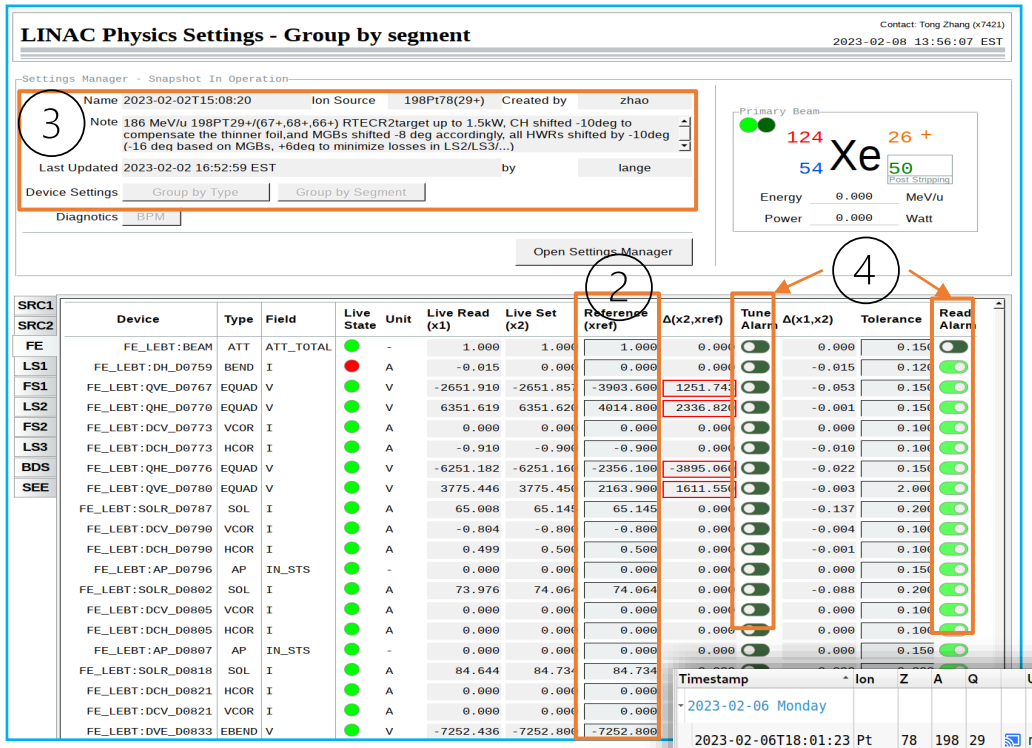


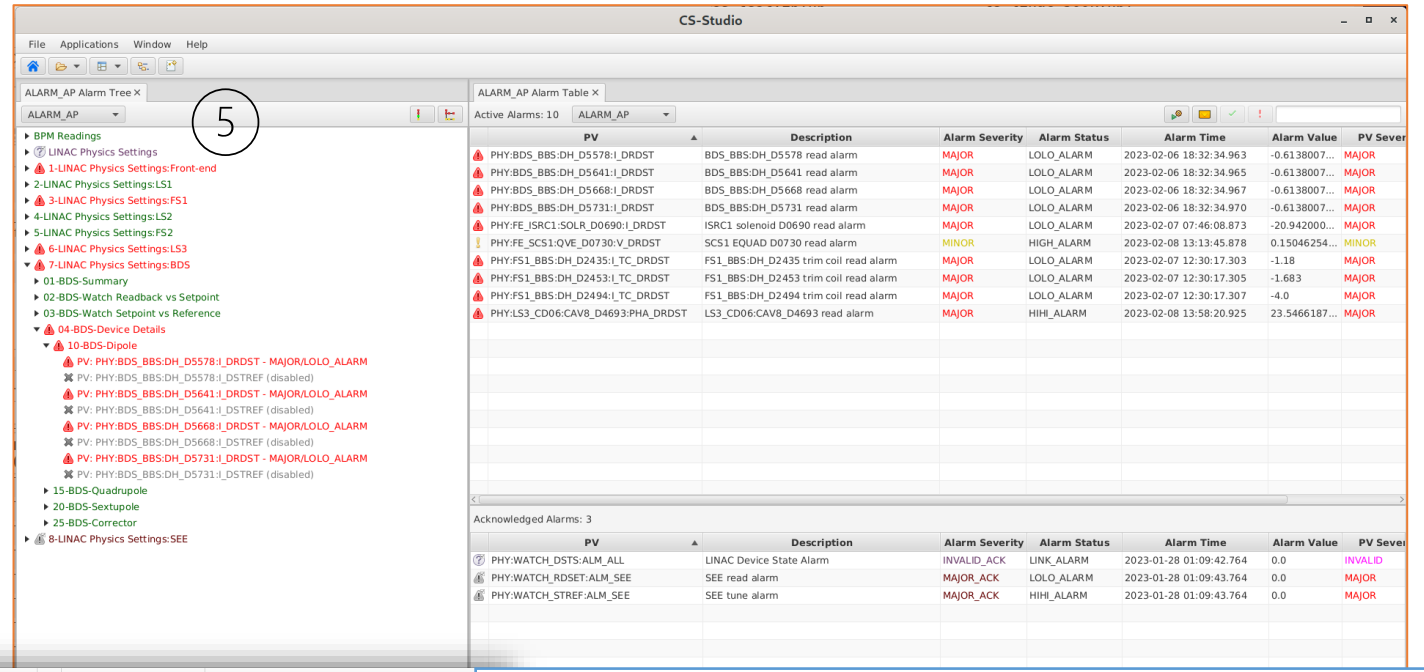
- ❑ Device settings alarms could be controlled by segment or
- ❑ Fine-grained per device in the device list pages

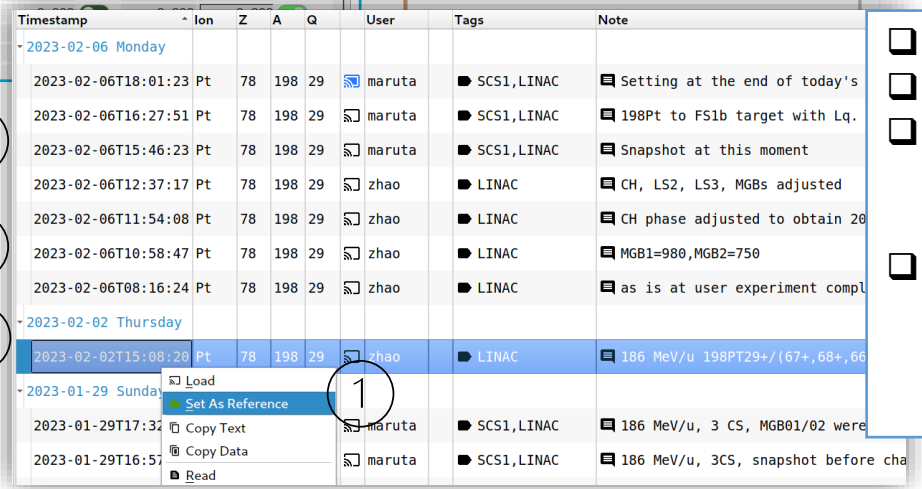
2



Settings Guard: Alarm System for Settings Manager







- From Settings Manager, push snapshot via "Set As Reference" (1)
- The Setpoint (x_0) values will be published as "Reference (xref)" (2)
- Together with the snapshot info (3)

- Tune alarm: monitor x0 (reference set) and x2 (live set)
- Read alarm: monitor x1 (live read) and x2 (live set)
- Alarm could be configured device-wised or segment-wised
  - Switch the slide button, see (4)
  - See (3) of last page
- The report page could be reached at Phoebus → Applications → Alarm → Alarm Tree: Select Alarm_AP in the dropdown menu, also could be opened in Alarm Panel or Alarm Table mode. (5)

References

- Settings Manager: Manage LINAC Physics Settings
  - https://wikihost.nscl.msu.edu/AcceleratorPhysics/doku.php?id=apps:settings_manager
- Settings Guard: Alarm System for LINAC Physics Settings
  - https://wikihost.nscl.msu.edu/AcceleratorPhysics/doku.php?id=apps:settings_guard