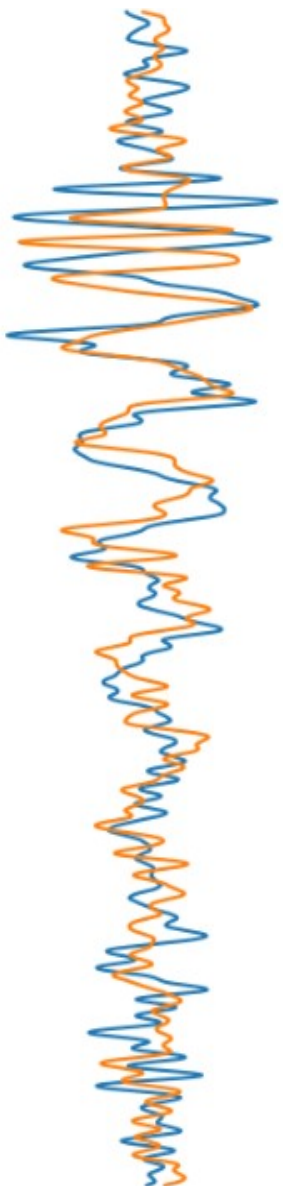


Academic Labbook Plugin for WordPress

A plugin for sustainable academic research on the largest blogging platform on the web

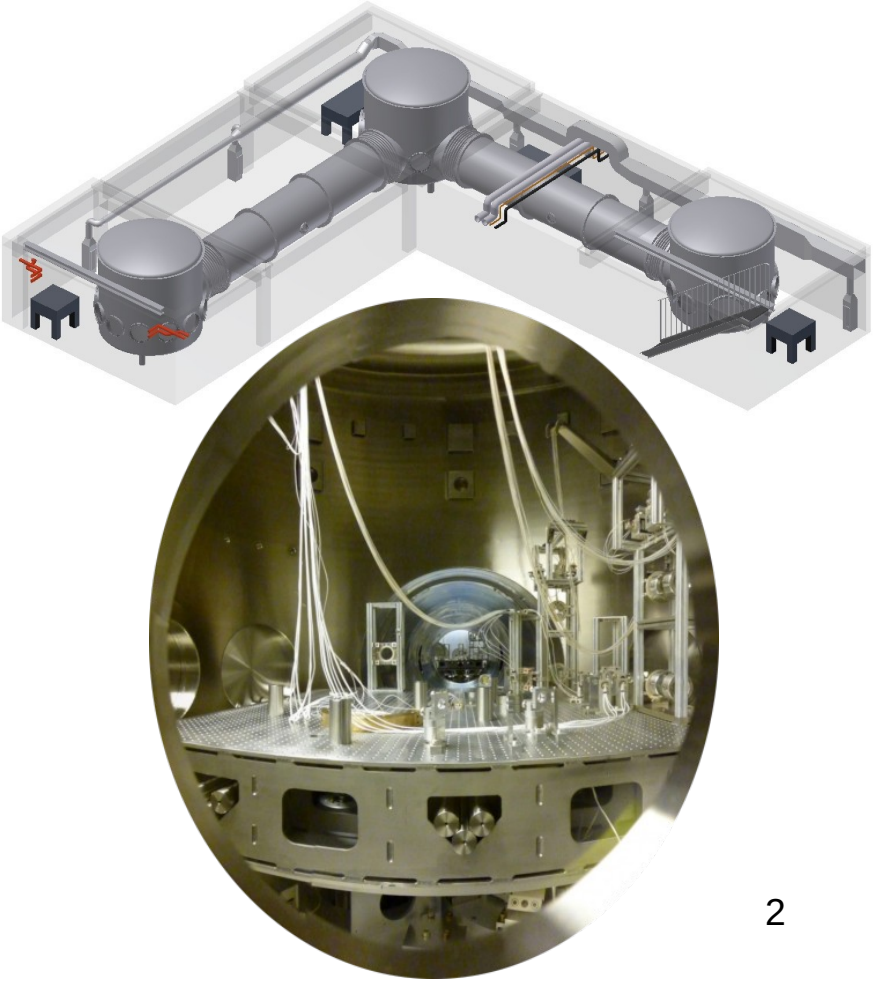
Dr Sean Leavey
Max Planck Institute for Gravitational Physics (Albert Einstein Institute)
2021-09-21

Max-Planck-Institut
für Gravitationsphysik
Albert-Einstein-Institut

MAX-PLANCK-GESELLSCHAFT

Who am I and why do I care about ELNs?

- Experimental physicist at MPI for Gravitational Physics in Hannover in the 10 m prototype group
- Long running experiment: many generations of students and postdocs have worked on the experiment since 2008
- “Learning the ropes” often only possible directly from others, rather than reading their notes - not optimal!
- **I believe people are happy to document their work to a higher level if given the right tools!**



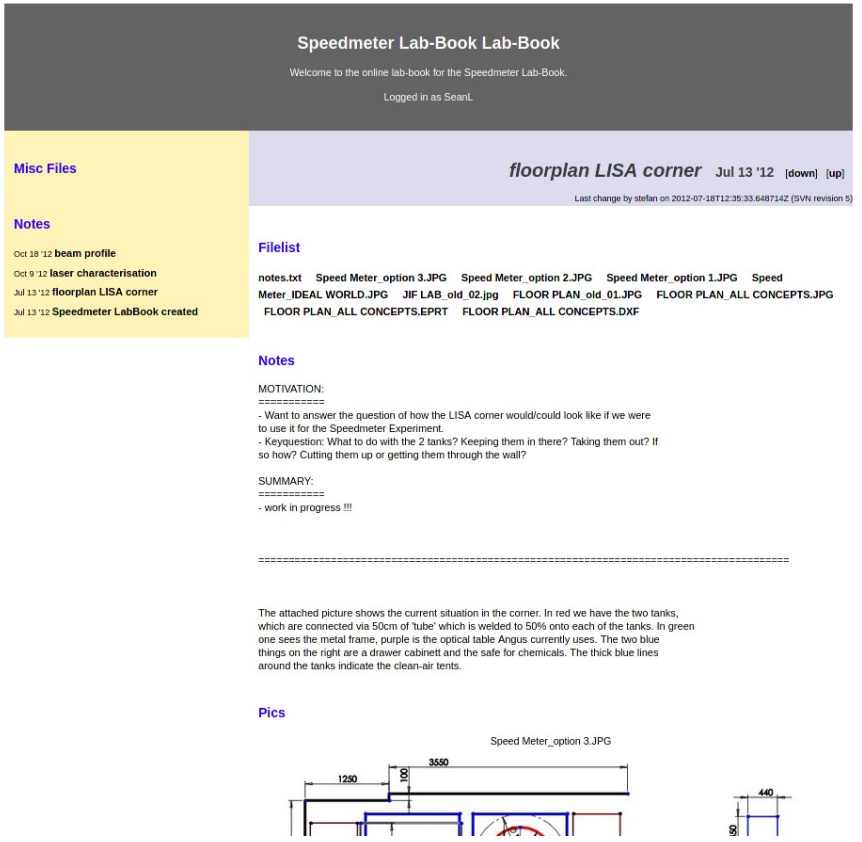
What this talk is about

- I developed a custom ELN for my group to “scratch an itch”
- Features focused on linking information and group organisational matters – **tries to make life easier**
- Now used by ca. 20 other groups
- Aimed at observational fields – less suitable for those with stricter labbook regulations (but WordPress could in principle work for those too)
- I’ll talk about:
  - what was wrong with the tools we used to use
  - my tool and how we use it
  - sustainability of ELN platforms

What I used to use...

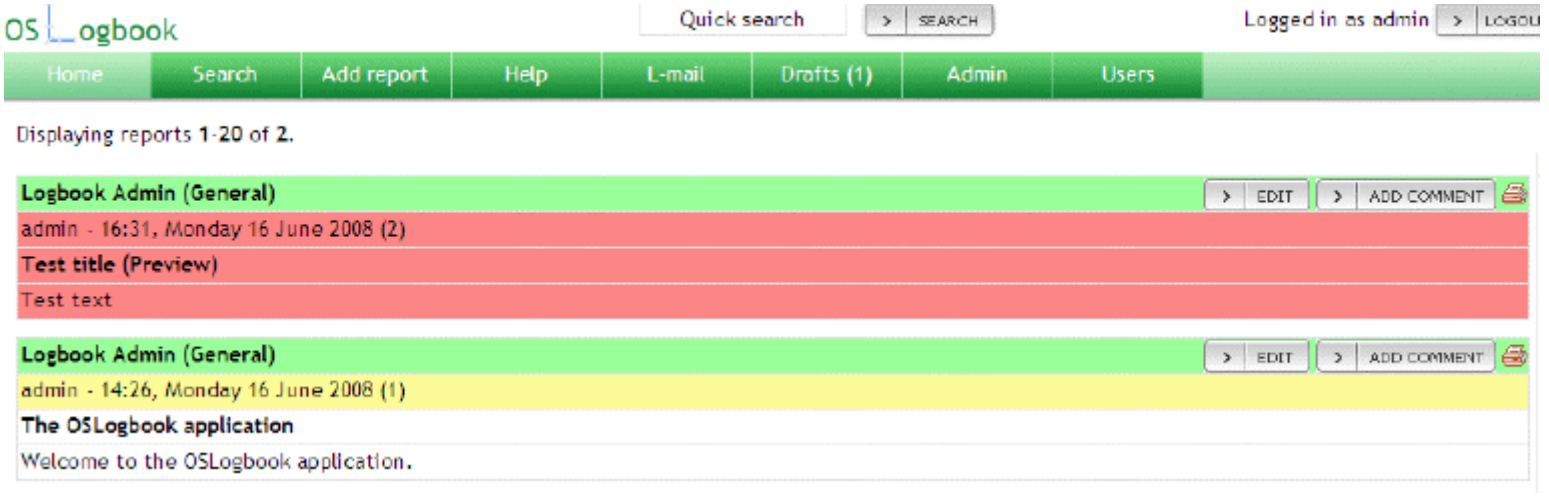
...early PhD: rudimentary web front end for text files stored in a version control system

- ✓ revision control (via SVN)
- ✗ images separate from text
- ✗ difficult to use for novices
- ✗ no categories, tags, etc.
- ✗ no search tools
- ✗ custom software platform



What I used to use...

...mid PhD: custom software from Virgo collaboration



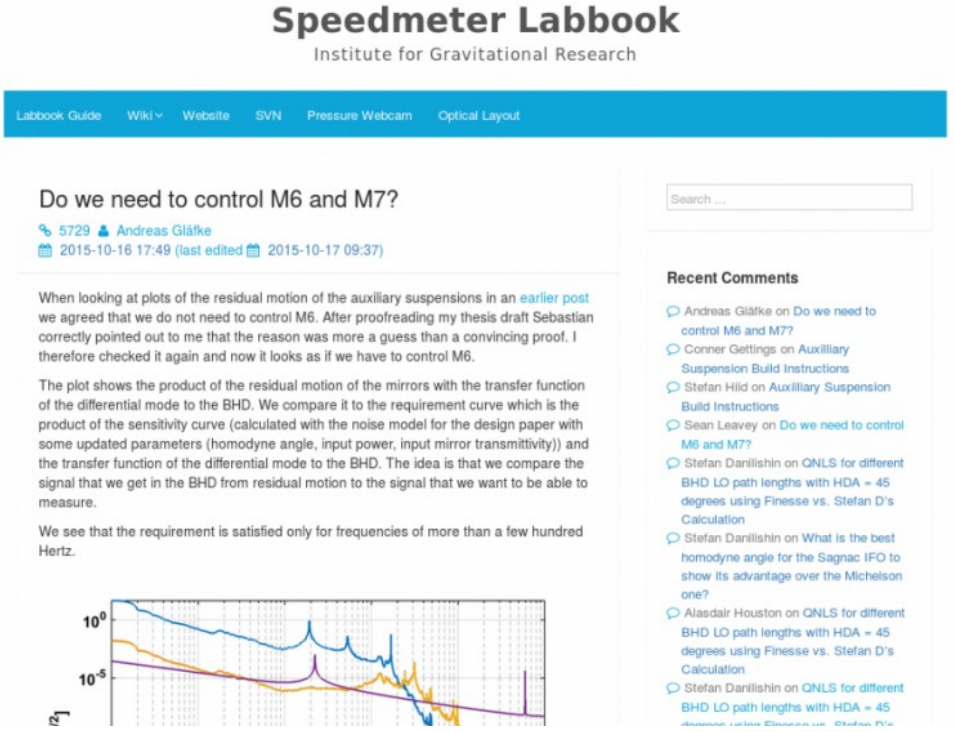
- ✓ categories and subcategories
- ✓ keyword search
- ✓/✗ WYSIWYG editor, but doesn't support inline images
- ✗ no revision control (intentional)
- ✗ custom software platform

What I used to use...

...late PhD: WordPress with lots of other peoples' plugins

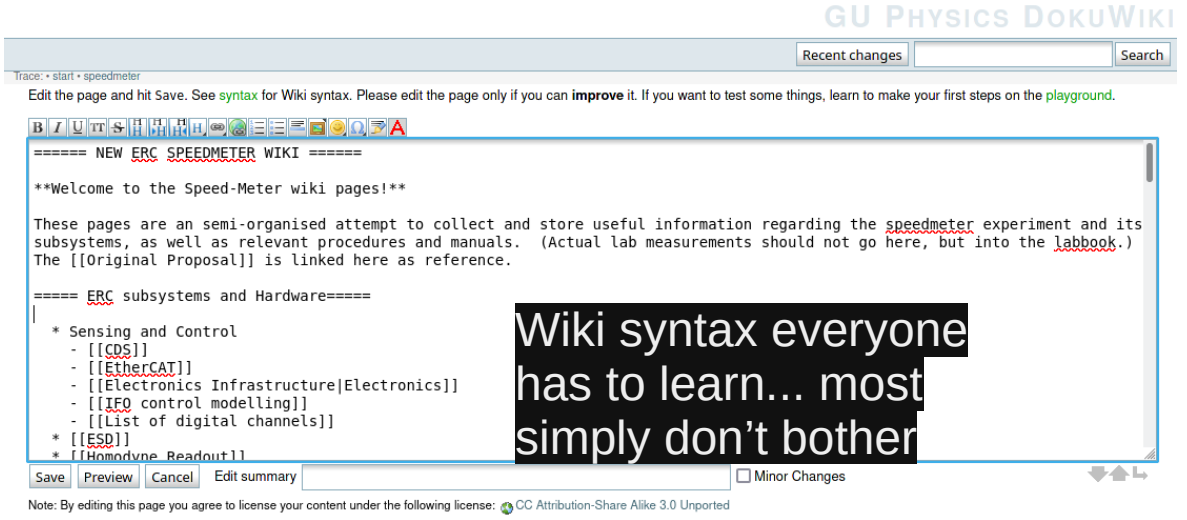
- ✔ WYSIWYG editor
- ✔ open source software (WordPress)
- ✔ revision control
- ✔ hierarchical categories, flat tags
- ✔ keyword search
- ✔ multiple authors per post

- ✘ no search by category / tag / authors
- ✘ relies on ~10 plugins, some practically abandoned



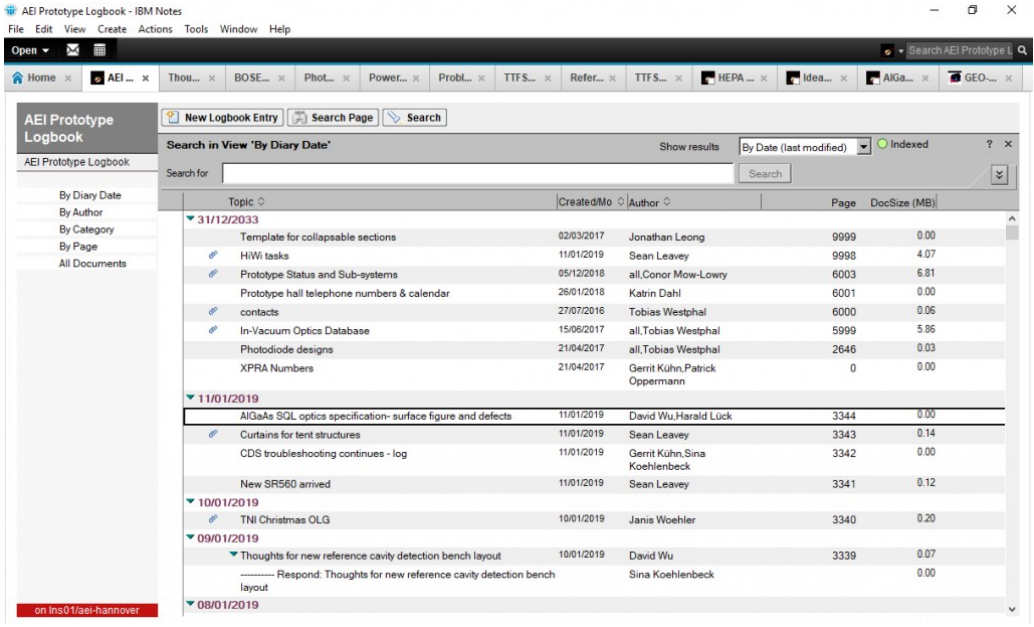
Still not quite happy.

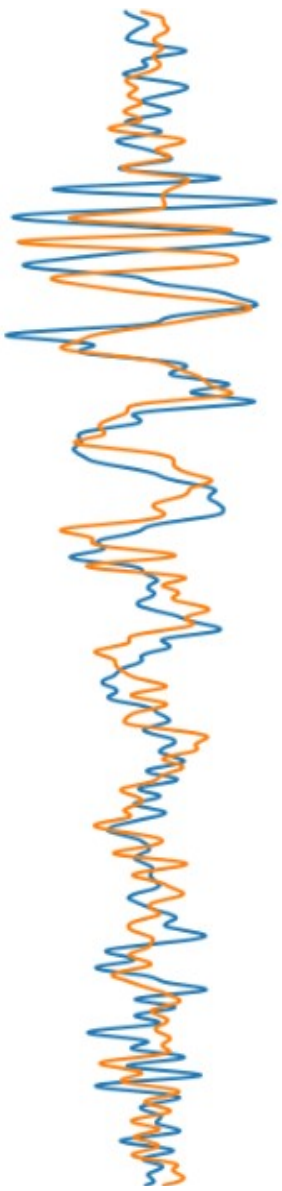
- WordPress is a great platform to build an ELN on top of
- But still needed separate wiki to document equipment, inventory, procedures, etc.
  - But wiki rarely updated by group members, and used a different, non-WYSIWYG editor
- Those ~10 plugins are a maintenance nightmare for IT
  - Relies on good will of voluntary maintainers
- **We can still do better!**



A search for better ELN software

- In 2018, our IT director announced the phasing out of the institute's IBM Notes based ELN
- Asked us what we needed
- I offered to help select the replacement given my experience
- I searched for solutions that fit my own and IT's requirements
- Nothing I found at the time was really optimal for us





A search for better ELN software

- “WordPress + 10 plugins” was a decent solution, but **hard to maintain in the long term**
- Quality of the plugins was also not always great – bugs, typos, ads, etc.
- I offered to take the ~10 plugins we were using and merge them into one, tailoring features
- This made IT happier – one plugin to maintain rather than ~10
- I knew what I wanted for my group. IT also had their requirements:
  - Integration with single sign-on service
  - Ideally free and open source (but not hard requirement)
  - No vendor lock-in – less pain to migrate to newer system later

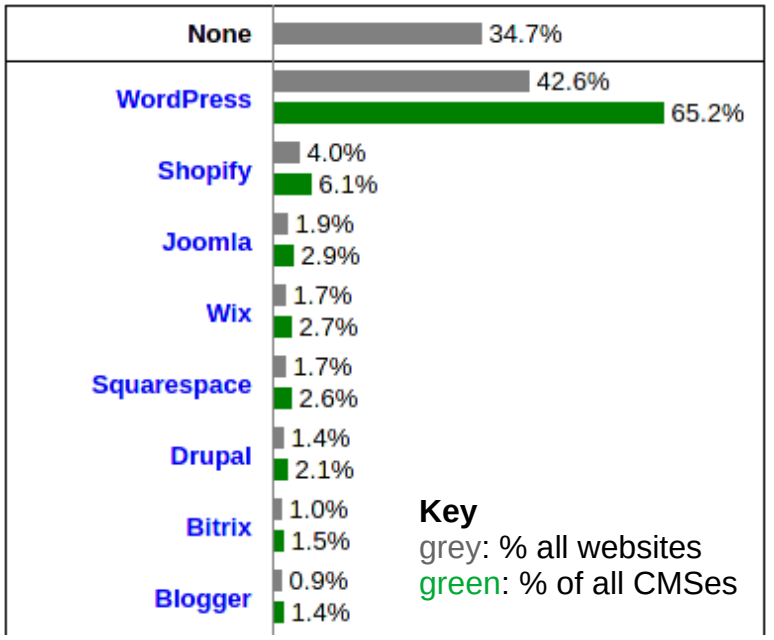
What makes a good ELN?

(in my opinion)

- “single stop shop” for group: ELN and wiki combined
- good search and indexing
- great editor with mathematics support
- easy navigation between posts/pages
- edit history / versioning
- bonus features: inventory, plugins, API support, etc...

What makes WordPress a good platform?

- Most widely used CMS on the web (42.6% of all websites!?)
- 1,749 employees working on it and related tech (Automaticc)
- Huge ecosystem of themes, plugins, admin tools, support
- Existing plugins for single sign-on, LDAP, etc.
- First class mobile support
- Multi-site support (same server and user accounts, but multiple “blogs”)
- Benefit from others’ work on the hard parts of building an ELN: security, accessibility, editor, integrations, apps, etc.
- Nothing is permanent in software, but WordPress might stand the best chance

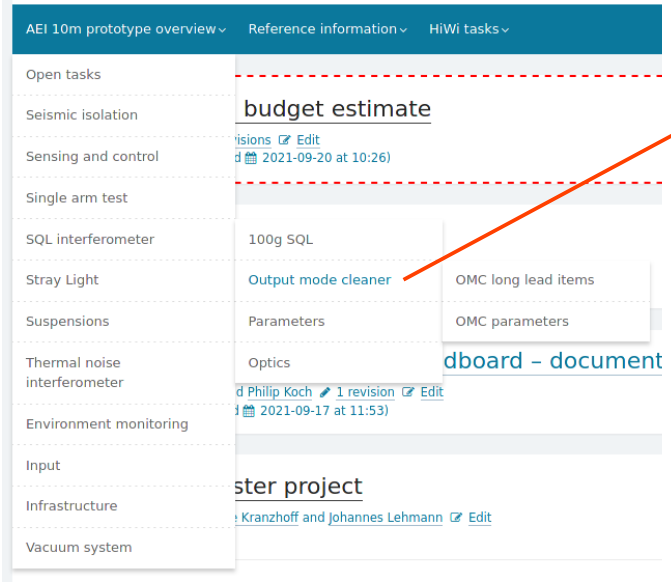


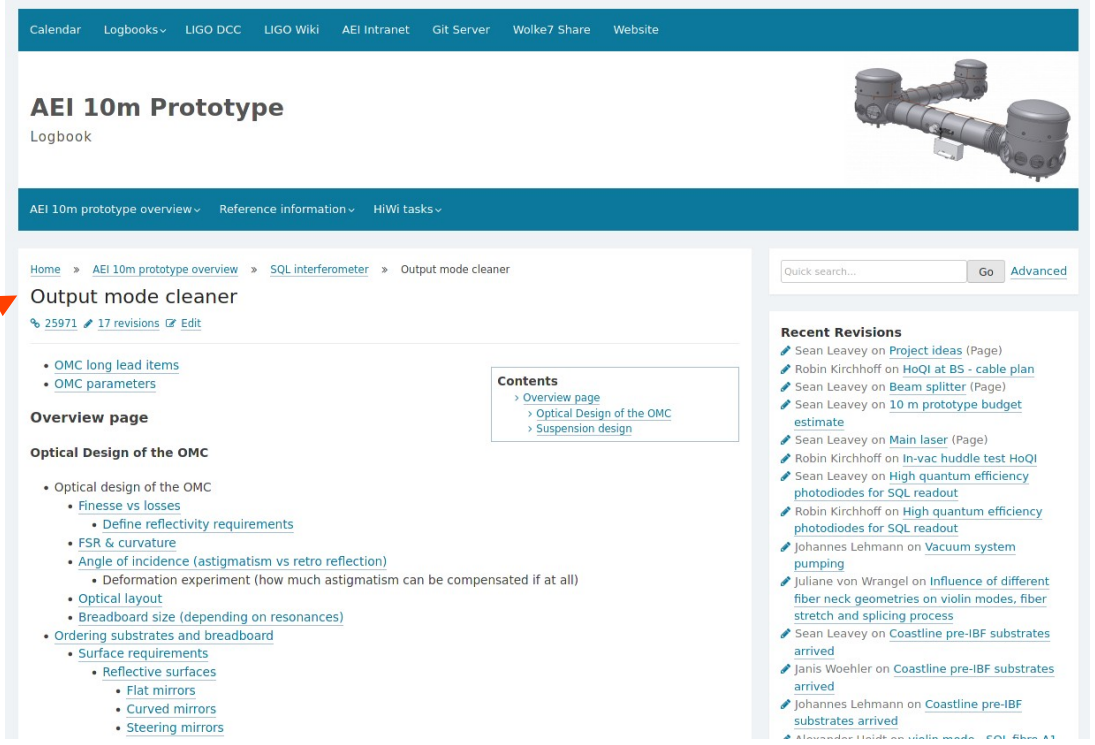
https://w3techs.com/technologies/overview/content_management

Combining ELN and wiki

Core WordPress feature

The menu hierarchy takes you to pages that can contain wiki-like content: experiment overviews, procedures, manuals, administration information, etc...





Easy post/page navigation

Cross-reference shown under each post/page

Cross-references

Posts/pages referenced by current post, and other posts/pages referencing this one

Links to

- Length and radius of curvature design for the OMC 2019-06-06
- Angle of incidence for OMC 2019-06-12
- OMC mirror reflectivities 2019-06-12

Linked from

- Meeting minutes 2019-06-14 2019-06-17
- Output mode cleaner (Page)

Auto-generated table of contents on pages

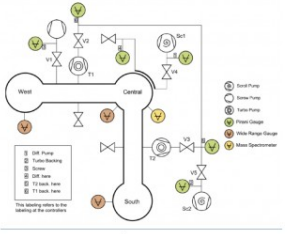
Home » AEI 10m prototype overview » Vacuum system

Vacuum system

24137 26 revisions Edit

Sub-pages:

- Venting
- Residual gas analyser (RGA)



Vacuum system overview.

Specification

Contents

- Specification
- Surface area
- Pumps and controllers
  - Screw pump
  - Scroll pumps
  - Turbo pumps
    - Control socket pinout
    - Disabling the operating hours warning light
    - Updating controller firmware
  - Pump rates
- Pressure gauges and controllers
  - Heads
  - Readout
    - Relay interface
  - CDS channels
- Valves and controllers
  - Valve controllers
    - Valve controller 1
    - Valve controller 2 (addon and bypass)

Child pages show a breadcrumb trail

Home » AEI 10m prototype overview » SQL interferometer » Output mode cleaner

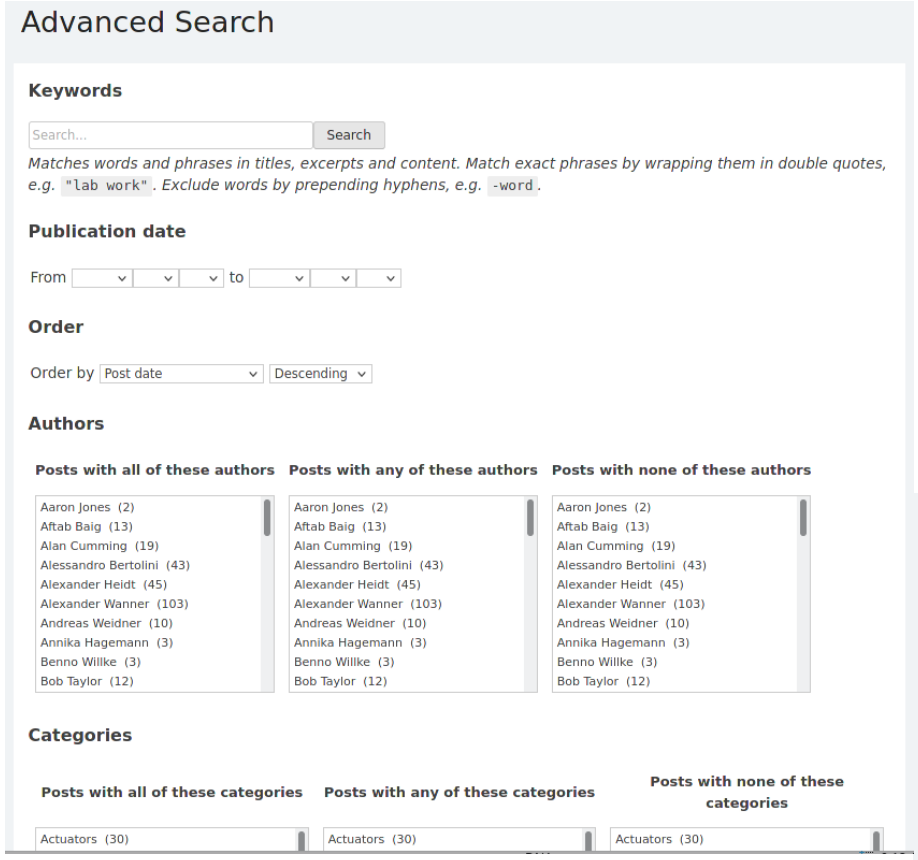
Output mode cleaner

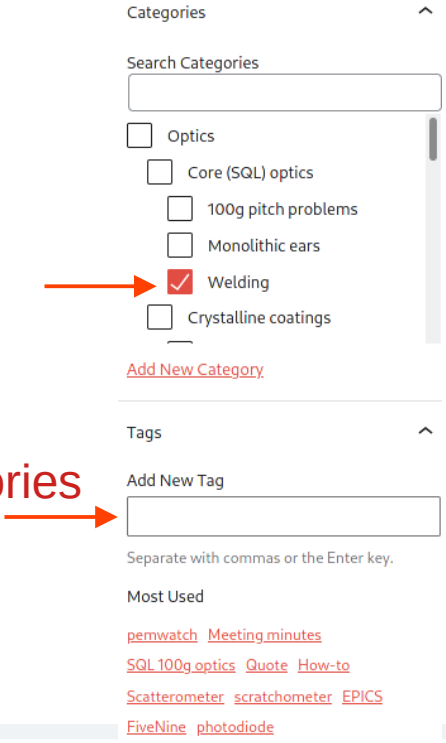
25971 17 revisions Edit

Enhancement of core WordPress feature

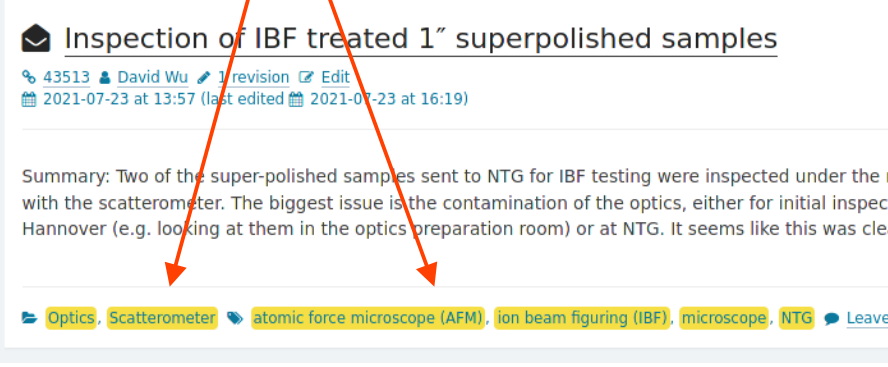
Good search and indexing

Advanced search: by author(s), date, categories, tags, etc.





Hierarchical categories and tags for posts



Edit history

Enhancement of core WordPress feature

Edit summaries under posts/pages linking to diff view

History

#	Date	User	Information
44192	18 hours ago	Johannes Lehmann	*clarified that we would not miniaturise the hoqi itself but the inertial sensor* **(current)**
44176	3 days ago	Sean Leavey	
42724	3 months ago	Sean Leavey	
38603	9 months ago	Sean Leavey	*added IBS scatter theoretical characterisation idea*

1 2 3 … 7 Next »

Front end view

Back end diff view

Recent edits shown in sidebar

Quick search… Go Advanced

Recent Revisions

- Sean Leavey on Project ideas (Page)
- Robin Kirchhoff on HoQI at BS - cable plan
- Sean Leavey on Beam splitter (Page)
- Sean Leavey on 10 m prototype budget estimate
- Sean Leavey on Main laser (Page)
- Robin Kirchhoff on In-vac huddle test HoQI
- Sean Leavey on High quantum efficiency photodiodes for SQL readout
- Robin Kirchhoff on High quantum efficiency photodiodes for SQL readout
- Johannes Lehmann on Vacuum system pumping
- Juliane von Wrangel on Influence of different fiber neck geometries on violin modes, fiber stretch and splicing process
- Sean Leavey on Coastline pre-IBF substrates arrived
- Janis Woehler on Coastline pre-IBF substrates

Great editor

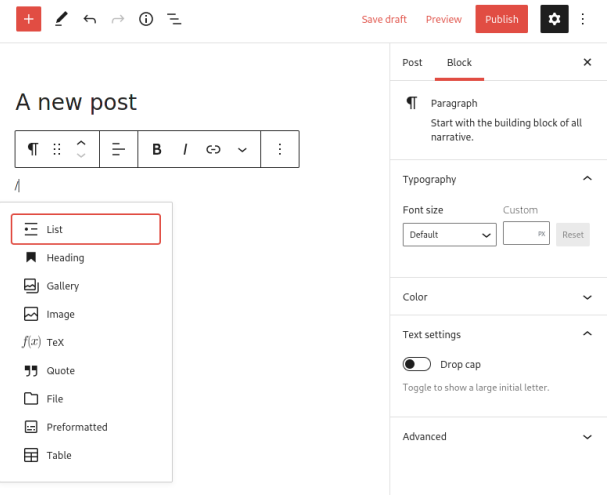
Enhancement of core WordPress feature

WordPress since v5 has included a “block-based” editor making it easier to compose content.

Interactive controls in the editor with instant preview.

Lots of useful blocks built-in (tables, galleries, PDF embed, etc.) but can also add more via plugins.

Blocks can pull in data from external services using JavaScript

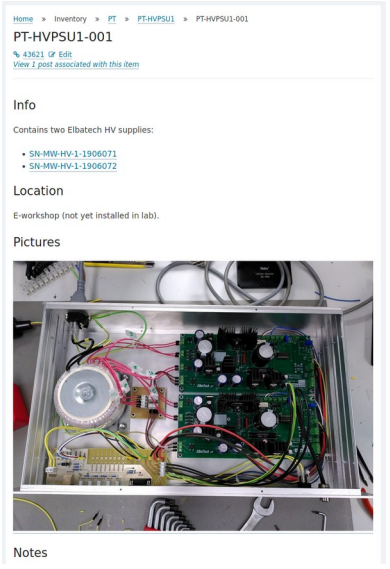


ALP adds a custom TeX block

TeX is rendered once you click away from the edit panel

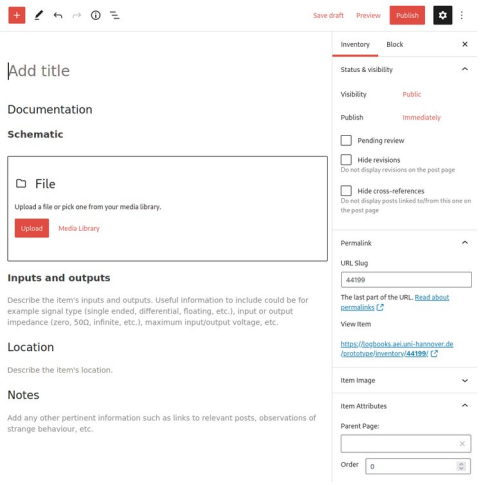
Some other features

(Basic) inventory system



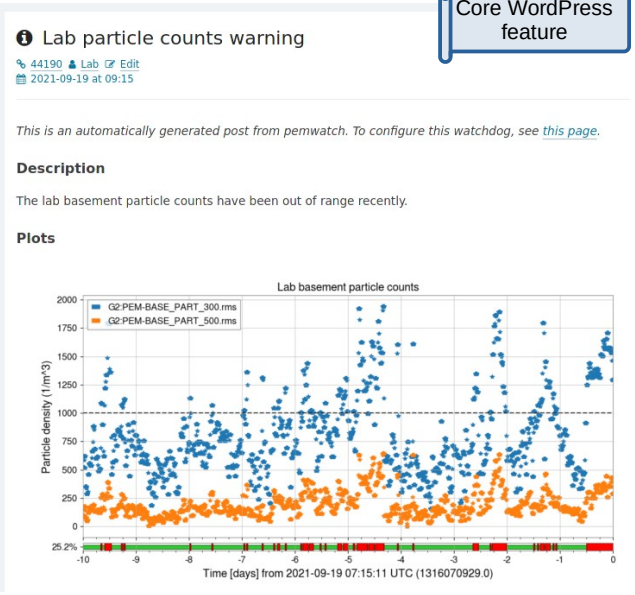
Templates: editor pre-populated with content on post creation

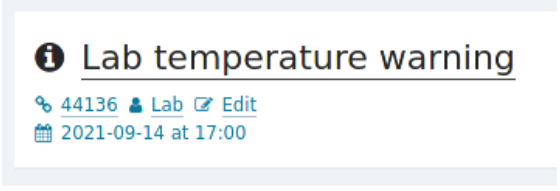
Core WordPress feature



Automatic posts from lab to logbook via REST API

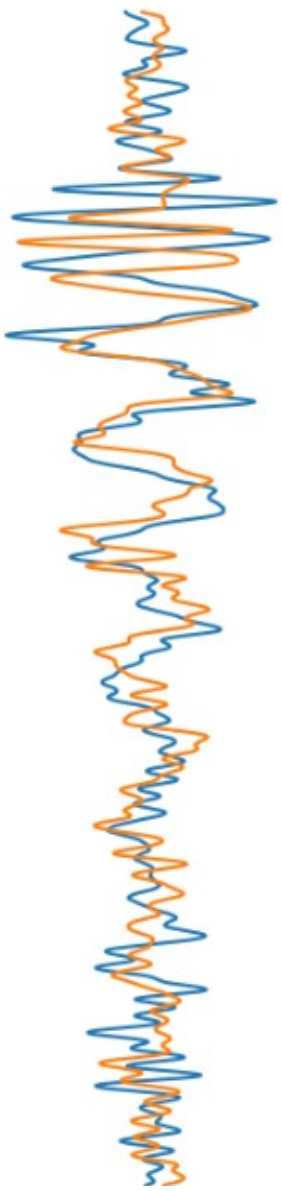
Core WordPress feature



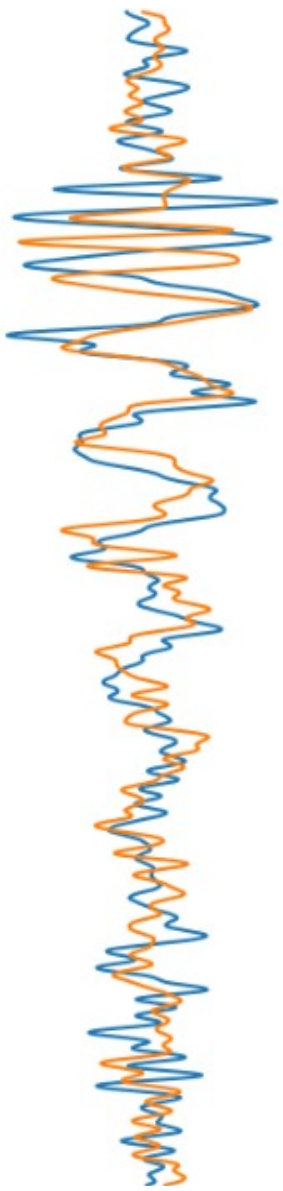


"Status" posts that don't take up much vertical space on post lists

+ thousands of other free WordPress plugins to add further customisations



Time for a quick demo?



Potential downsides

ALP is not for all groups and organisations...

✕ ability to edit everything later (intentional in the case of ALP)
- may not be compatible with requirements for your organisation
- (✓but changes do get tracked)

✕ usefulness as a long term archive requires discipline not to install too many additional WordPress plugins
- WordPress's extensibility is not an entirely good thing

✕ not fully documented, especially on the user side (though WordPress docs are great)

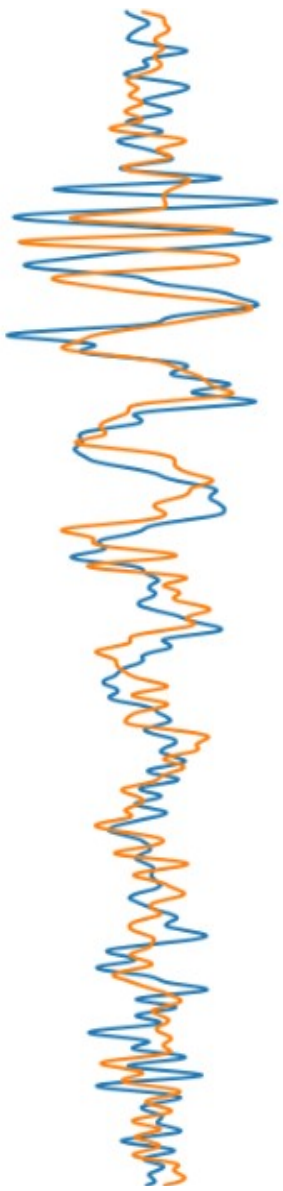
✕ updates must be installed manually (may be automatic later)

✕ large changes made to WordPress core might disrupt plugin in future (but WordPress has maintained strict backwards compatibility so far)

✕ WordPress sites are under constant attack; regular updating and good IT security essential

✕✕ currently only one maintainer (me)

Given the points above, some groups might choose another solution – but this works really well for us and our collaborators



We use ALP for **almost everything** in my group!

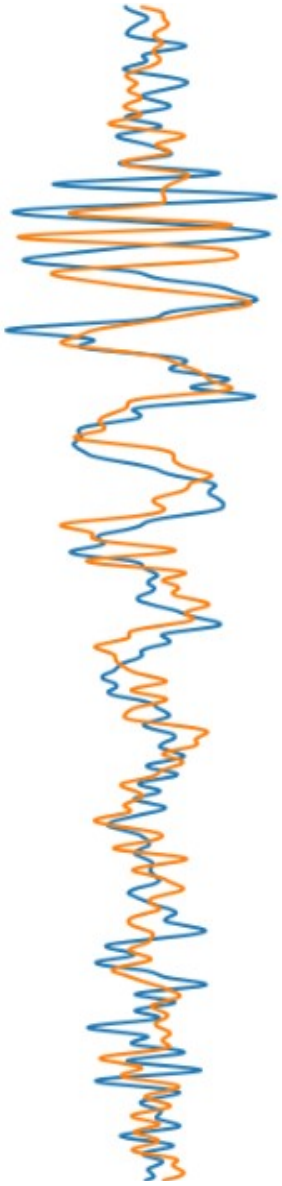
...for new content

Experiment progress (measurements, changes, etc.): **new post**
Uploading photos from lab: **add to media library via Wordpress app or website**
Documenting short update (e.g. “lasers switched off”): **new status post**
Creating experiment overview, admin, static information: **new page**
Documenting equipment info (e.g. manual for oscilloscope, location, etc.): **new inventory item**
Getting everyone’s attention: **add a sticky post** (sticks to top of front page)

...for making our jobs easier, and group project management

Looking up procedures: **find checklist / instructions on a page**
Keeping track of project progress: **maintain pages with links to relevant posts / plans, continuously updated by those involved**
Finding old experimental results: **search using keywords, categories, tags, authors, etc.**
Checking for equipment location, abilities, “gotchas”, etc.: **check inventory page**
Remembering project ideas for summer students: **maintain a project ideas page**
Automatic weekly meeting agendas: **sort new posts in chronological order**
Linking meeting minutes to posts: **make a status post with cross-references to discussed posts**

We use the logbook as the “front page” of our experiment. Everything should be on there, or linked from there.



Who else uses ALP?

- ~10 groups at AEI Hannover (~100 people)
- Gravitational wave detector GEO600
- Various gravitational wave instrumentation groups
- So far groups from Germany, Netherlands, UK, and USA
- + a few others who I only know via GitHub/email

GEO600
Gravitational Wave Detector

Max-Planck-Institut
für Gravitationsphysik
Albert-Einstein-Institut

Gωδ

University of Glasgow
VIA VERITAS VITA

Caltech

Returning to “what makes a good ELN?”

My opinion

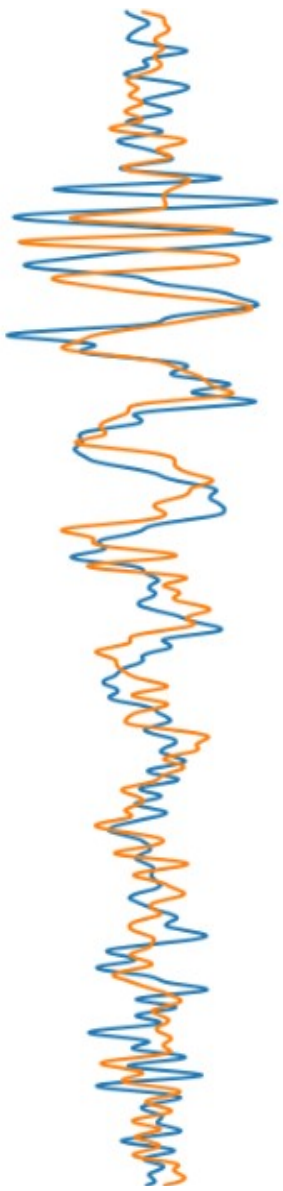
Often overlooked is the **future sustainability of the ELN platform**.

My institute got burned by this when IBM increased licence fees for their Notes software to unaffordable levels.

We’re trying to get rid of walled gardens in academia (MPG encourage use of open access journals), so **shouldn’t we be building on top of open source and widely used software platforms?**

I think the worldwide research community is missing a **free, open source “killer app” ELN** that furthers MPG’s open science principles.

My dream: MPG funds development of something like ALP and make it available to everybody! Can we and do we want to make this happen?



Thanks for listening!

Website: https://alp.attackllama.com/

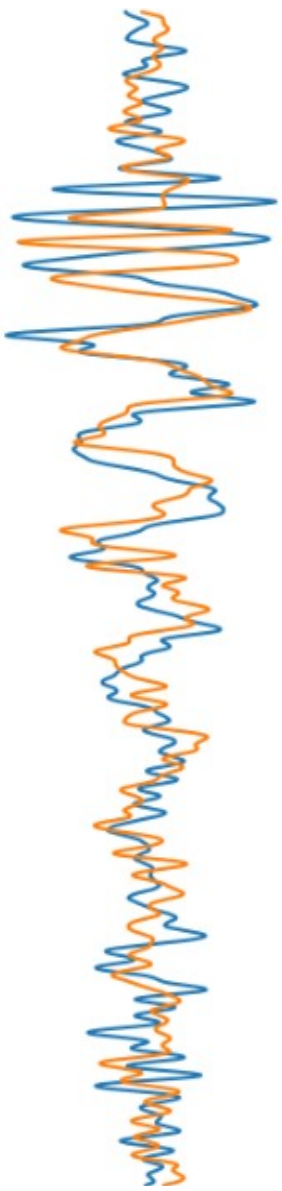
Development on GitHub: https://github.com/Academic-Labbook/

My email (I’m happy to help you set it up): sean.leavey@aei.mpg.de

Example of a public instance of ALP: https://logbooks.ifosim.org/

“Test drive” site coming at some point when I have time

Developers, testers and users welcome!



EXTRA SLIDES

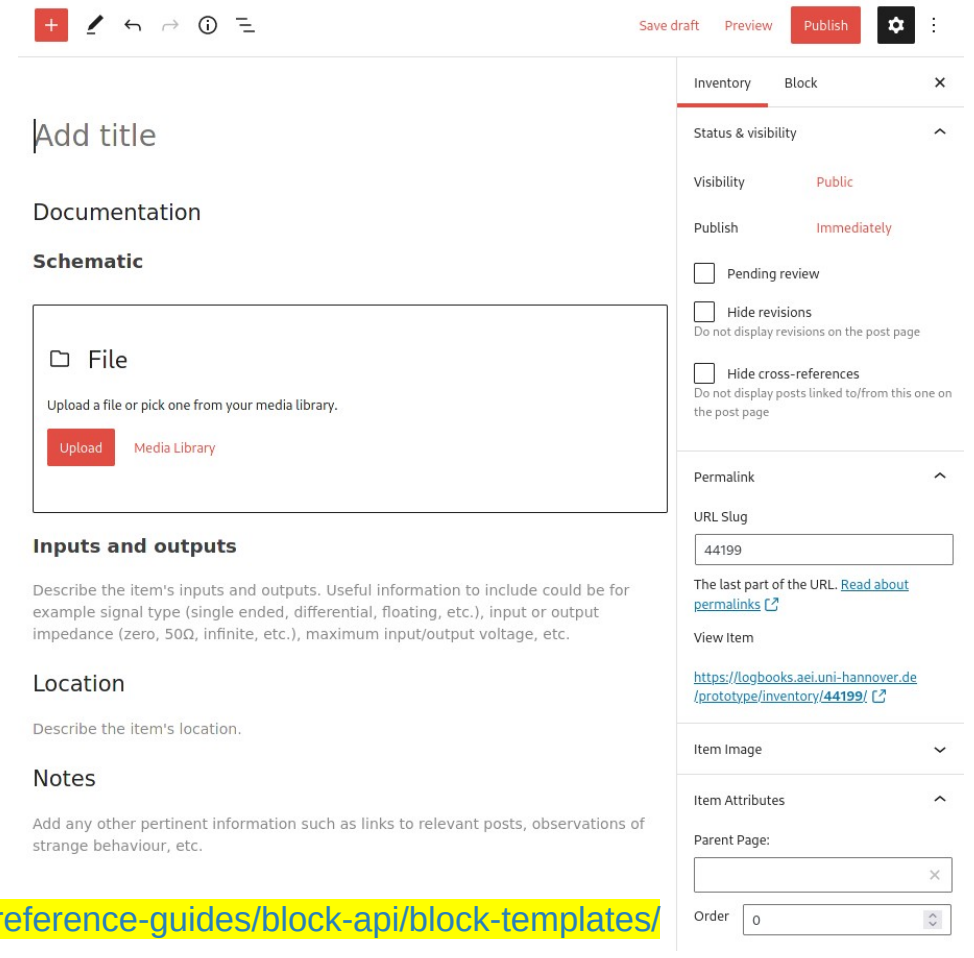
WordPress post templates

Core WordPress feature

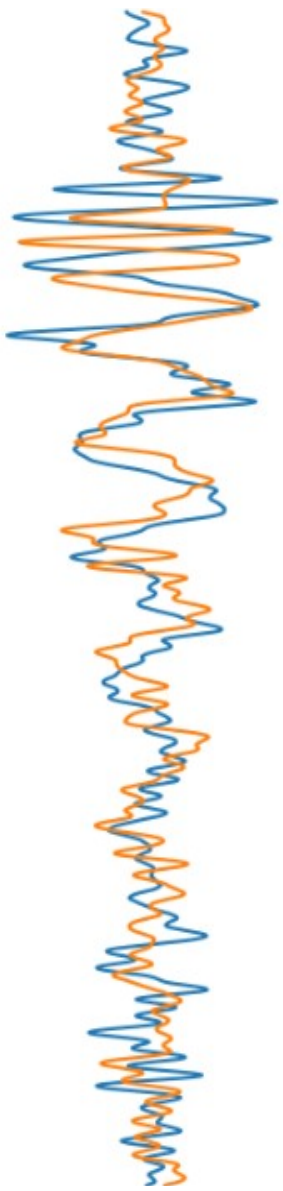
The block editor can allow the user to choose (or require the use of) a template.

It’s possible to use templates for the whole post, or just a section of it.

Currently only possible by writing a small plugin. Support for managing templates will eventually be added to the WordPress dashboard.



https://developer.wordpress.org/block-editor/reference-guides/block-api/block-templates/



WordPress database structure

- WordPress uses a concept of “post types” and “taxonomies” internally
- These can be used to implement custom content types like inventory items, chemicals, etc. and custom categories or tags for other content types
- Allows many-to-many relationships between posts and terms, which can represent most information
- Allows arbitrary metadata to be associated with such posts and taxonomies too (e.g. key-value data)
- Lets you build custom applications on top of the WordPress platform
- Many aspects of the custom application can be managed in the admin dashboard via automatically generated controls, or with minimal additional code
- Plugins also available to manage custom post types and taxonomies if you don’t write your own
- If such an ELN is migrated to a new service, the underlying data structures are relatively straightforward and similarly formatted (10 database tables used for ALL content)
- On the front-end, it’s possible to create post views for particular post types, categories, tags, etc. (and combinations thereof)
- https://wordpress.org/support/article/taxonomies/

Cross-reference graph

For fun, plotted graph of cross-references for the Advanced LIGO logbook.

Essentially a “web of science” for a particular experiment. Also looks remarkably like typical sources of gravitational waves!

Adding colours to represent categories, authors, etc. will add additional insight – to do in the future

Code available on GitHub project.