

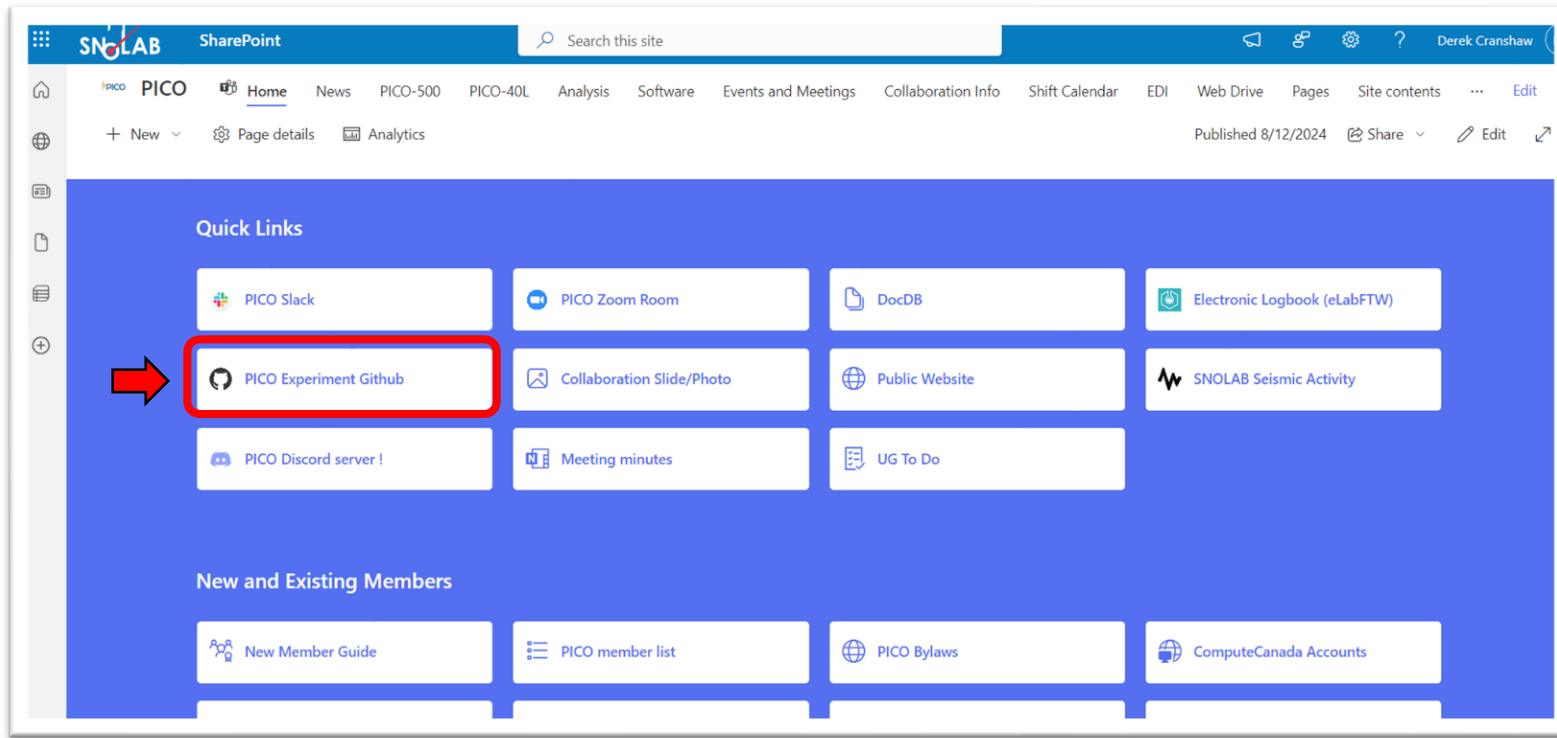
GitHub Projects and Analysis Code Structure

Derek Cranshaw
PICO Collaboration Meeting
SNOLAB
August 22, 2024

A Vision for Github Projects

- Single landing point where ongoing software and analysis efforts can be seen at a glance.
 - New members can see what's being done and who's doing what, so they know where to reach out for questions.
 - Brief description of analysis or software ideas with no personnel assigned.
- Attached to Github, where the code for all analyses should be kept.
 - Any tasks associated to a repository issue is synced between the project and the issue tracker.
 - Priority broadly reflects how soon the output of an analysis affects operational decisions.

Where to find it



<https://github.com/orgs/picoexperiment/projects/2>

Where to find it

SNOLAB SharePoint

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Quick Links

- PICO Slack
- PICO Zoom Room
- DocDB
- Electronic Logbook (eLabFTW)
- PICO Experiment Github
- Collaboration Slide/Photo
- Public Website
- SNOLAB Seismic Activity

New and Existing Members

- New Member Guide

<https://github.com/orgs/picoexperiment/projects/2>

picoexperiment

Type to search

Overview Repositories **Projects 1** Packages Teams 1 People 78 Settings

PICO Experiment

14 followers <http://www.picoexperiment.com> Follow

Popular repositories

- PICOJarTracker** (Public)
Forked from xtachx/PICOJarTracker
Tracks the relative movement between detector and camera
C++
- AutoBub3hs** (Public)
Forked from xtachx/AutoBub3hs
Automatic bubble finder based on OpenCV for the PICO-60 dark matter search experiment!
C++

View as: Public

You are viewing the README and pinned repositories as a public user.

You can create a README file or pin repositories visible to anyone.

Get started with tasks that most successful organizations complete.

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PICO Experiment

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14 followers <http://www.picoexperiment.com>

Popular repositories

- PICOJarTracker**
Forked from xtachx/PICOJarTracker
Tracks the relative movement between...

Projects

Recently viewed

- Created by me
- Projects
- Templates

Welcome to projects

Built like a spreadsheet, project tables give you a live canvas to filter, sort, and group issues and pull requests. Tailor them to your needs with custom fields and saved views.

Learn more

is:open New project

picoexperiment

Type to search

Overview Repositories Projects Packages Teams People Settings

Projects

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Learn more

is:open New project

1 recently viewed

- Ongoing Software and Analysis Efforts** Private

#2 updated 3 days ago

Views – By repository

Views →

Sorted by Repo

Ongoing Software and Analysis Efforts

By repository Team capacity My items + New view

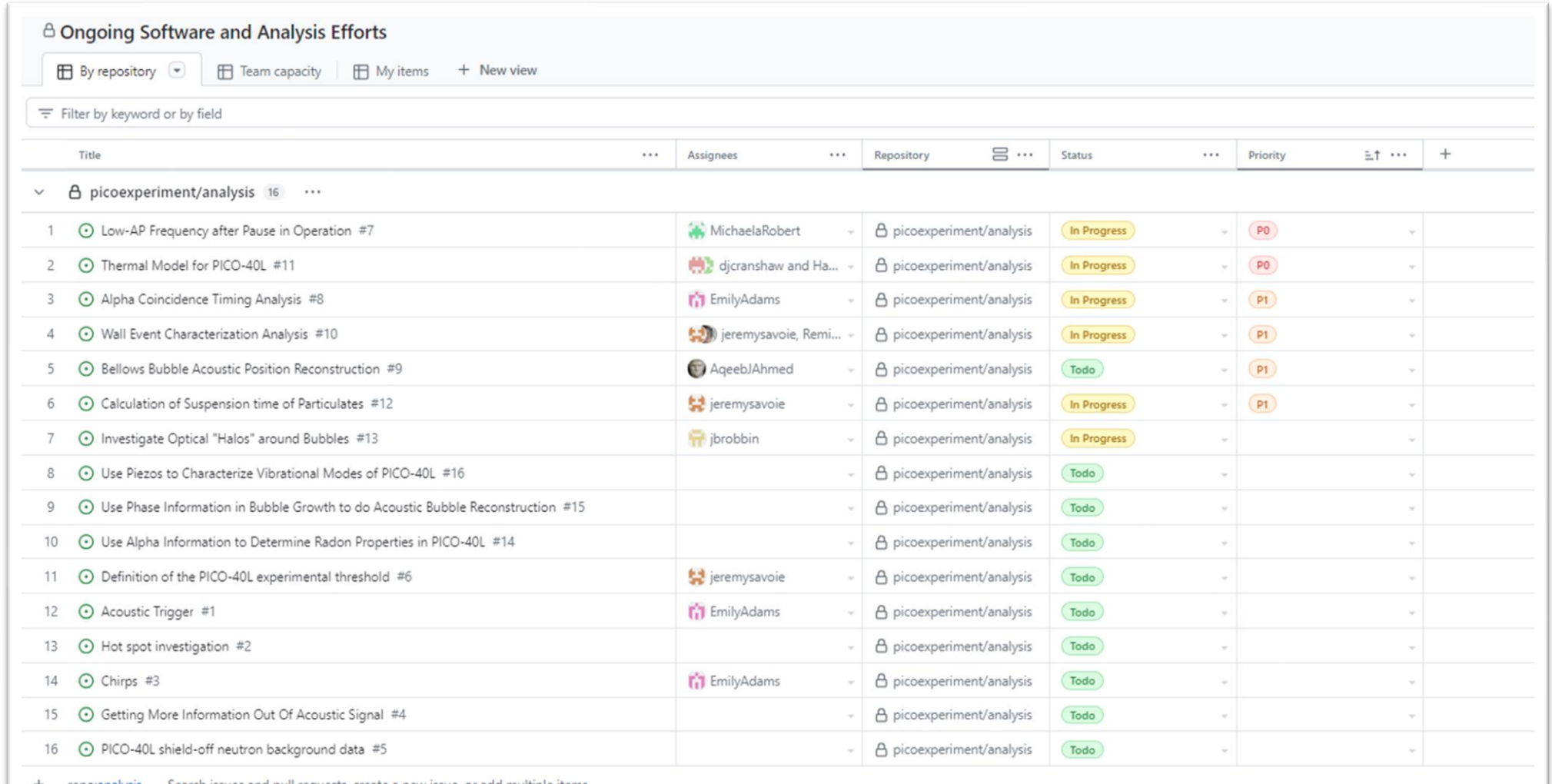
Filter by keyword or by field

Title	Assignees	Repository	Status	Priority
picoexperiment/analysis 16				
1 Low-AP Frequency after Pause in Operation #7	MichaelaRobert	picoexperiment/analysis	In Progress	P0
2 Thermal Model for PICO-40L #11	djcranshaw and Ha...	picoexperiment/analysis	In Progress	P0
3 Alpha Coincidence Timing Analysis #8	EmilyAdams	picoexperiment/analysis	In Progress	P1
4 Wall Event Characterization Analysis #10	jeremysavoie, Remi...	picoexperiment/analysis	In Progress	P1
5 Bellows Bubble Acoustic Position Reconstruction #9	AqeebAhmed	picoexperiment/analysis	Todo	P1
6 Calculation of Suspension time of Particulates #12	jeremysavoie	picoexperiment/analysis	In Progress	P1
7 Investigate Optical "Halos" around Bubbles #13	jbrobbin	picoexperiment/analysis	In Progress	
8 Use Piezos to Characterize Vibrational Modes of PICO-40L #16		picoexperiment/analysis	Todo	
9 Use Phase Information in Bubble Growth to do Acoustic Bubble Reconstruction #15		picoexperiment/analysis	Todo	
10 Use Alpha Information to Determine Radon Properties in PICO-40L #14		picoexperiment/analysis	Todo	
11 Definition of the PICO-40L experimental threshold #6	jeremysavoie	picoexperiment/analysis	Todo	
12 Acoustic Trigger #1	EmilyAdams	picoexperiment/analysis	Todo	
13 Hot spot investigation #2		picoexperiment/analysis	Todo	
14 Chirps #3	EmilyAdams	picoexperiment/analysis	Todo	
15 Getting More Information Out Of Acoustic Signal #4		picoexperiment/analysis	Todo	
16 PICO-40L shield-off neutron background data #5		picoexperiment/analysis	Todo	
repo:analysis Search issues and pull requests, create a new issue, or add multiple items				
picoexperiment/AutoBub3hs 3				
17 Optics-based Bubble Tracking and Velocity Measurement #10	minyabai and qmalin	picoexperiment/AutoB...	In Progress	P1
18 Theoretical background for bubble data analysis #8		picoexperiment/AutoB...	Todo	

Views – By repository

Views →

Sorted by Repo



Title	Assignees	Repository	Status	Priority
picoexperiment/analysis (16)				
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9 Use Phase Information in Bubble Growth to do Acoustic Bubble Reconstruction #15		picoexperiment/analysis	Todo	
10 Use Alpha Information to Determine Radon Properties in PICO-40L #14		picoexperiment/analysis	Todo	
11 Definition of the PICO-40L experimental threshold #6	jeremysavoie	picoexperiment/analysis	Todo	
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16 PICO-40L shield-off neutron background data #5		picoexperiment/analysis	Todo	

- Every task must be associated with a GitHub repository
 - Use the Analysis repository unless the task is associated to some other repository (e.g. Autobus improvements are associated to the Autobus3hs repository).

Views – Team capacity

The screenshot displays a project management interface titled "Ongoing Software and Analysis Efforts". At the top, there are navigation options: "By repository", "Team capacity" (selected), "My items", and "+ New view". Below this is a search bar "Filter by keyword or by field".

On the left, there is a list of assignees with their names and a "Deselect" column showing the number of tasks assigned to each:

Assignees	Deselect
AqeebAhmed	1
b-ali	1
djcranshaw	1
EmilyAdams	3
Hantz-N	2
jbrobbin	1
jeremysavoie	3
MichaelaRobert	1
minyabai	3
qmalin	1
RemiHill	1
stephensekula	3
No Assignees	10

The main area shows a list of tasks under the heading "No Priority" with a total of 10 items and an estimate of 0. The tasks are:

Title	Status	Size	Estimate
1 Use Piezos to Characterize Vibrational Modes of PICO-40L #16	Todo	-	-
2 Use Phase Information in Bubble Growth to do Acoustic Bubble Reconstruction #15	Todo	-	-
3 Use Alpha Information to Determine Radon Properties in PICO-40L #14	Todo	-	-
4 Hot spot investigation #2	Todo	-	-
5 Getting More Information Out Of Acoustic Signal #4	Todo	-	-
6 PICO-40L shield-off neutron background data #5	Todo	-	-
7 No support for multi-bubble events #2	Todo	-	-
8 Missing 40l-22 camera masks #9	Todo	-	-
9 Improve multi-bubble detection in XYZLookup #93	Todo	-	-
10 Capture plotting infrastructure on Github	Todo	-	-

A red arrow points from the "No Assignees" row in the assignees list to the task list.

- Easily find tasks with unassigned personnel, opportunities for new members.
- When someone leaves the collaboration, shows which tasks need to be picked up.

An Example

Ongoing Software and Analysis Efforts

Add status update

By repository Team capacity My items + New view

Filter by keyword or by field Discard Save

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8 Use Piezos to Characterize Vibrational Modes of PICO-40L #16		picoexperiment/analysis	Todo	
9 Use Phase Information in Bubble Growth to do Acoustic Bubble Reconstruction #15		picoexperiment/analysis	Todo	
10 Use Alpha Information to Determine Radon Properties in PICO-40L #14		picoexperiment/analysis	Todo	
11 Definition of the PICO-40L experimental threshold #6	jeremysavoie	picoexperiment/analysis	Todo	

An Example

The screenshot shows a GitHub issue page for 'Alpha Coincidence Timing Analysis #8'. The issue is open and is part of the 'picoexperiment/analysis' repository. The issue description discusses the acoustics of PICO-40L and the analysis of alpha peaks. The issue is assigned to Emily Adams and is part of the 'Ongoing Software and Analysis Efforts' project. The issue is currently in progress and has a priority of P1.

Alpha Coincidence Timing Analysis #8

Open | picoexperiment/analysis | Private

djcranshaw opened on Feb 28

The excellent acoustics of PICO-40L allow us to, with some efficiency, distinguish the alphas coming from the decays of Rn-222, Po-218, and Po-214. By carefully analysing the time correlations between events in these separate alpha peaks, doublet and possibly triplet events originating from the decay of the same atom in the Rn-222 decay chain may be identifiable. If this is possible, studying the position of the events in the chain may be used as a proxy for the movement of the atom, giving insight into the patterns of convection in the C3F8 during operation.

djcranshaw added this to **Ongoing Software and Analysis Efforts** on Feb 25

djcranshaw assigned **EmilyAdams** on Feb 28

djcranshaw converted this from a draft issue on Feb 28

EmilyAdams 3 hours ago

edited by EmilyAdams · Edits · ...

Assignees | EmilyAdams

Labels | No labels

Projects | Ongoing Software and Analysis Efforts

Status: In Progress

Priority: P1

Size: Filter options

Estimate: Enter number...

Iteration: Choose an iteration

Start date: No date

End date: No date

An Example

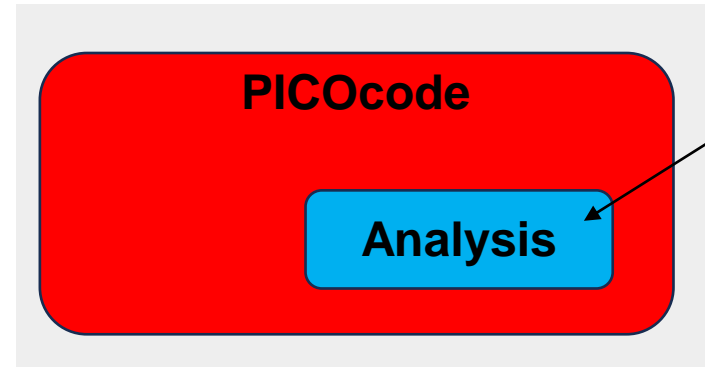
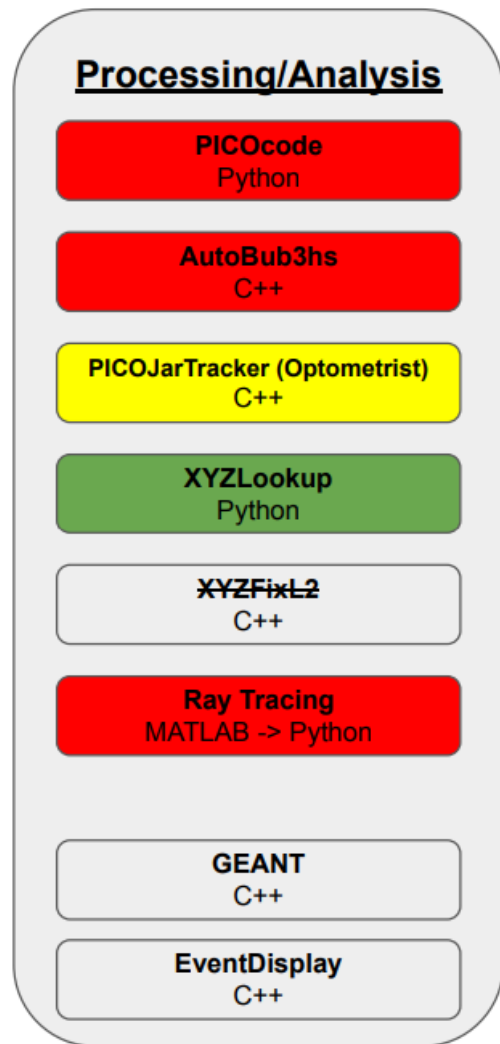
The screenshot shows a GitHub issue page for 'Alpha Coincidence Timing Analysis #8'. The issue is open and private, located in the repository 'picoexperiment/analysis'. The main content is a text description: 'The excellent acoustics of PICO-40L allow us to, with some efficiency, distinguish the alphas coming from the decays of Rn-222, Po-218, and Po-214. By carefully analysing the time correlations between events in these separate alpha peaks, doublet and possibly triplet events originating from the decay of the same atom in the Rn-222 decay chain may be identifiable. If this is possible, studying the position of the events in the chain may be used as a proxy for the movement of the atom, giving insight into the patterns of convection in the C3F8 during operation.' The issue has a timeline of activity: 'djcranshaw opened on Feb 28', 'djcranshaw added this to Ongoing Software and Analysis Efforts on Feb 25', 'djcranshaw assigned EmilyAdams on Feb 28', and 'djcranshaw converted this from a draft issue on Feb 28'. The issue is assigned to EmilyAdams and is part of the project 'Ongoing Software and Analysis Efforts' with a status of 'In Progress' and a priority of 'P1'. The left sidebar shows a list of issues, with 'Alpha Coincidence Timing' selected.

- Timeline of progress, and jump-off point for documentation.

Keeping up to Date

- The more people use the system, the more useful the system will be, which will encourage more use.
 - Don't want to make this a burden or time-sink, but it should be just a few extra minutes of work each week.
 - Can be as simple as a sentence or two describing a progress update, or a link to some slides on DocDB (or both).
- Not a place for long, detailed write-ups, but a great place to link to them.
- Once a task is complete, final comment can link to a thesis, paper, or some other write-up, then marked as closed.
- The project should be up to date as of this week. Please check that your assignments reflect reality, and for the tasks you're working on, see if I've missed anything.

Processing and Analysis Code



Git submodule of PICOcode
(often called “UserCode” when checked out
according to the readme instructions).

PICOCode:

- Responsible for coordinating the analysis chain.
- Calls the relevant optics submodules (autobub, etc.).
- Processes the non-optics instrumentation data.
- The thing that runs on the raw data to produce recon files like the merged_all.txt file.
 - Analysis-specific codes that aren’t required for processing don’t really belong here. They should go in the analysis repository (a.k.a. UserCode)

Analysis Repository Structure

analysis Private Edit Pins Watch 1

main 1 Branch 0 Tags Go to file Add file Code

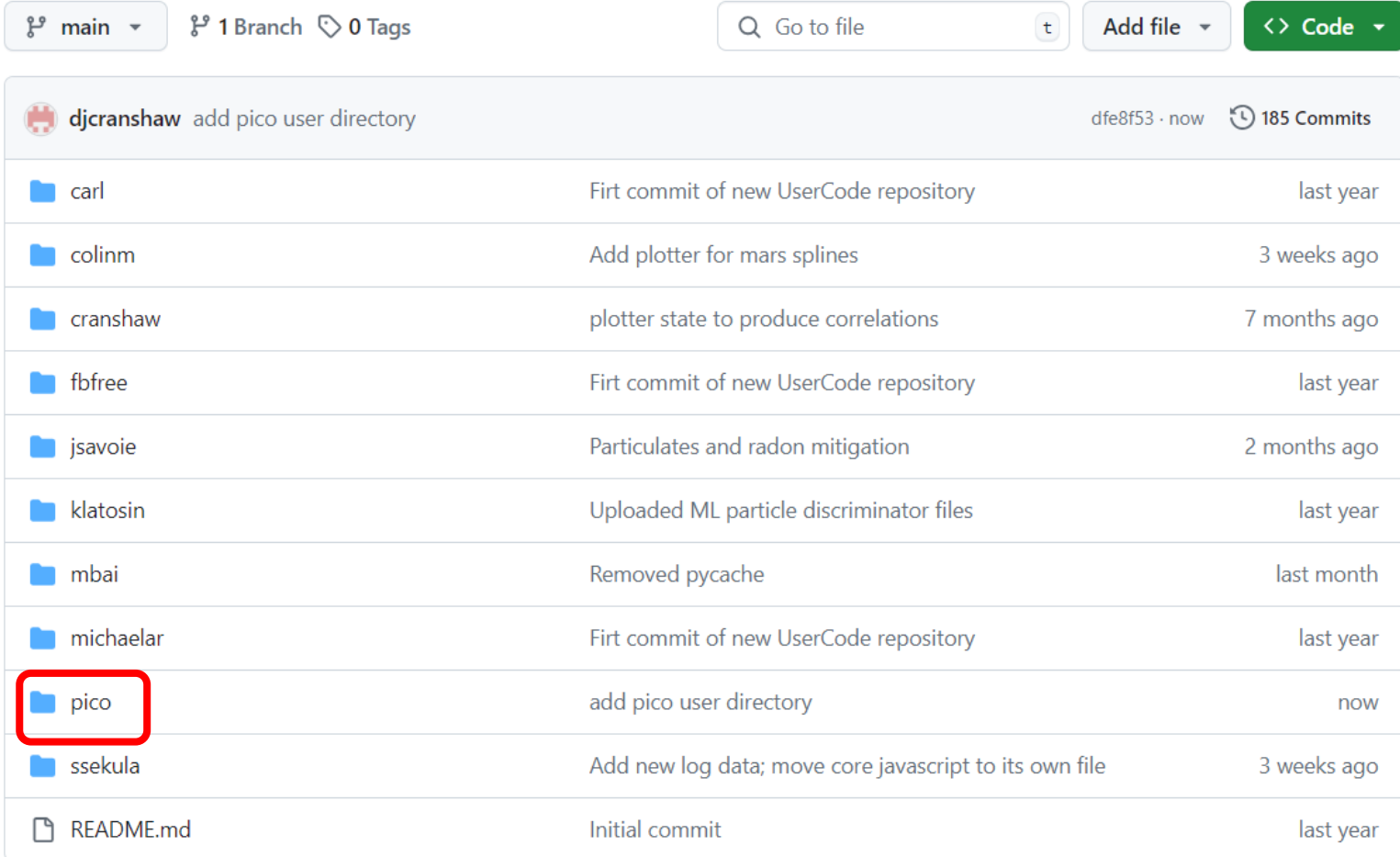
CJRMoore Add plotter for mars splines 068ad9a · 3 weeks ago 184 Commits

carl	Firt commit of new UserCode repository	last year
colinm	Add plotter for mars splines	3 weeks ago
cranshaw	plotter state to produce correlations	7 months ago
fbfree	Firt commit of new UserCode repository	last year
jsavoie	Particulates and radon mitigation	2 months ago
klatosin	Uploaded ML particle discriminator files	last year
mbai	Removed pycache	last month
michaelar	Firt commit of new UserCode repository	last year
ssekula	Add new log data; move core javascript to its own file	3 weeks ago
README.md	Initial commit	last year

- This is ... quite un-gitlike. But it's the model we've been using without confusion, so probably it's fine for us.

Code Quality

- Want to encourage code sharing – commit early, commit often.
 - Requiring beautiful code discourages committing and makes sharing more difficult.
- But... messy, undocumented code is much harder to use (though often better than nothing).
- Proposal...



The screenshot shows a GitHub repository interface for a repository named 'pico'. The repository is currently on the 'main' branch, with 1 branch and 0 tags. The repository was last committed by 'djcranshaw' with the commit hash 'dfe8f53' and the message 'add pico user directory'. The repository has 185 commits. The file list includes several folders and one file:

File/Folder	Commit Message	Commit Time
carl	First commit of new UserCode repository	last year
colinm	Add plotter for mars splines	3 weeks ago
cranshaw	plotter state to produce correlations	7 months ago
fbfree	First commit of new UserCode repository	last year
jsavoie	Particulates and radon mitigation	2 months ago
klatosin	Uploaded ML particle discriminator files	last year
mbai	Removed pycache	last month
michaelar	First commit of new UserCode repository	last year
pico	add pico user directory	now
ssekula	Add new log data; move core javascript to its own file	3 weeks ago
README.md	Initial commit	last year

The Model

- Your user directory is yours to version and store all your analysis code, in whatever state it's in.
 - It needn't be fully complete or documented – can be useful to point others to just to show how to do some simple analysis task (like instantiate a ReconFile or Event object, etc.)
 - We trust each other not to push over top of each other's directories.
- The pico directory is to store well-documented, structured pieces of code which produce some specific result (like produce plots, compute rates, etc.).
 - Should follow “PICO golden rules” (Colin is currently adapting these COUPP golden rules).
 - Allows anyone in the collaboration to reproduce plots or results.
 - Ideally, any plots or results shown in papers or at conferences, and important plots in theses, should have some code that allows it to be reproduced.
 - This also ensures we're all showing the same thing at conferences etc.

Adding to pico

- pico is currently empty.
 - Will add a copy of the PICO golden rules once they're ready.
 - Will add a simple calculation which will also serve as an example for how the code could be structured.
- Ideally, would be nice to have code reviewed before going into pico by using a PR from a separate branch, as is currently being done for PICOcode.
 - Is this overkill? I like the idea but what do the other analysers think?
 - Can't enforce this via branch protection rules, can just trust each other to do this.
 - Review can be quasi-enforceable for individual folders (via git pre-commit hooks, ask me if you're interested). Very easy to spin up, but this might be overkill as well.
- The goal is that this will make everyone's lives a little easier - Let's try this.