

Plot style guidelines

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for the “Plot style task force”:
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Situation

DUNE Plot Styles

This page contains a work-in-progress set of requirements and recommendations for DUNE plot styles. The plot requirements are aimed at accessibility and readability, while the plot recommendations produce a DUNE signature style that all collaborators are encouraged (but not required) to adopt. Functions and code examples for each style guideline will be provided.

Requirements [\[edit\]](#)

- All DUNE plots should be:
 - Easily readable to their intended audience (i.e. a paper reader or presentation viewer). All text, including axis labels and titles should be large enough to be read.
 - Labeled with the appropriate water mark (typically one of the following: DUNE, DUNE Preliminary, DUNE Work in Progress, DUNE Simulation)
 - Saved in .png, .eps, .C, .root (or python equivalent)

Recommendations [\[edit\]](#)

- Font and font size (TBD)
- Color palette:
 - The Color palette for plots should look appealing and be accessible to those with color blindness. The [Okabeito color palette](#) is recommended.

- Left shows the *entirety* of the current DUNE plot style guidance
- We would like, minimally:
 - ▶ More explicit “recommendations,” particularly to provide a unified visual theme
 - ▶ Easy-to-use software toolkit to help users follow the rules & recommendations
- Reach goal:
 - ▶ Technical means for tagging “provenance” of approved plots in image metadata
- Young DUNE APB representative was charged by APB to flesh this out. Though Alex Moor is now YD rep, I'm trying to carry this over the finish line

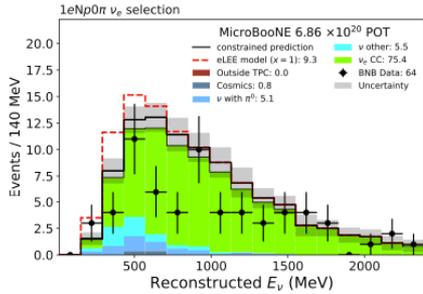
[from DUNE wiki https://wiki.dunescience.org/wiki/DUNE_Plot_Styles]

“YD Plot Style Guidelines Task Force”

- Rather than do it all myself, I solicited volunteers from Young DUNE to join a “Plot Style Guidelines Task Force”
 - ▶ Self-selection implies volunteers actually care about presentation and/or ease-of-use in tools
 - ▶ Helps diversify opinions/experience so that first draft to APB already covers many perspectives
- 5 volunteers (+ me):
 - ▶ Adam Lister (Wisconsin)
 - ▶ Andrew Mogan (Colorado State)
 - ▶ Kevin Wood (LBNL)
 - ▶ Oliver Lantwin (IN2P3)
 - ▶ Asa Nehm (Mainz)
 - ▶ JW (Tufts)
- We have arrived at a set of first materials to propose to APB

What we have

From the latest MicroBooNE publication (<https://arxiv.org/pdf/2110.14054.pdf>)



We assembled a gallery of diverse plots from ~15 different published sources (inside & outside DUNE) and discussed what's good & bad about them

- Pro
 - AL: Axis labels easy to read
 - AL: Like shaded histogram as error bar
 - OL: Data sample clearly labelled
 - OL: Normalisation of histograms explicit
- Contra
 - AL: The green/cyan are hard to distinguish +AM +PN +JW +OL
 - AL: Legend should be much larger +AM +JW
 - AL: Legend ordering could be improved - put all filled histograms in one column?
 - JW: dislike the shaded "error" band (unclear whether something is between the top of green and the black line?)
 - OL: grey uncertainty should be directly under "constrained prediction" in legend to make it clear what it applies to
- Other
 - OL: Are the numbers behind the legend contributions the integral? Why are they

We completed a set of guidelines based on our discussion, which we submit to the APB for consideration

DUNE plotting guidelines and recommendations

We split these guidelines into two parts, [requirements](#) and [recommendations](#). Requirements should be followed unless there is a good reason not to, while recommendations help you prepare publication-quality plots conforming to the guidelines, and give additional advice and points to consider.

The approval process for plots is out of scope of this document and covered elsewhere.

The `dune-plot-style` package offers sensible default for `ROOT` and `matplotlib`, to aid following these recommendations. Contributions to `dune-plot-style` for other plotting packages are welcome.

Requirements

- Plots should be easily readable to their intended audience. All text, including axis labels and titles, should be large enough to be read. Note that the size and other properties of the plot might need to be adapted for presentations or papers, as ideal text sizes etc. depend on the use.
- All plots should be labelled with the appropriate water mark (typically one of the following: DUNE, DUNE Preliminary, DUNE Work In Progress, DUNE Simulation).
- For reusability, please save plots at least in one lossless format, ideally vector-based (e.g. pdf, eps), in addition to high-quality raster-based versions (.png). It is recommended to avoid lossy compression such as .jpg. For reproducibility and adaptability, it is also recommended to keep the code generating the plot in version control, and/or distributing the .C macro version of the plot alongside it.

Recommendations

- Using plot titles (above the top of the figure) is discouraged as they are often overlooked. Prefer embedding relevant information in plot axes or annotations inside the figure itself.
- If any numbers are displayed on a plot, ensure they have only a reasonable number of significant figures. Prefer *readability over extra information*.

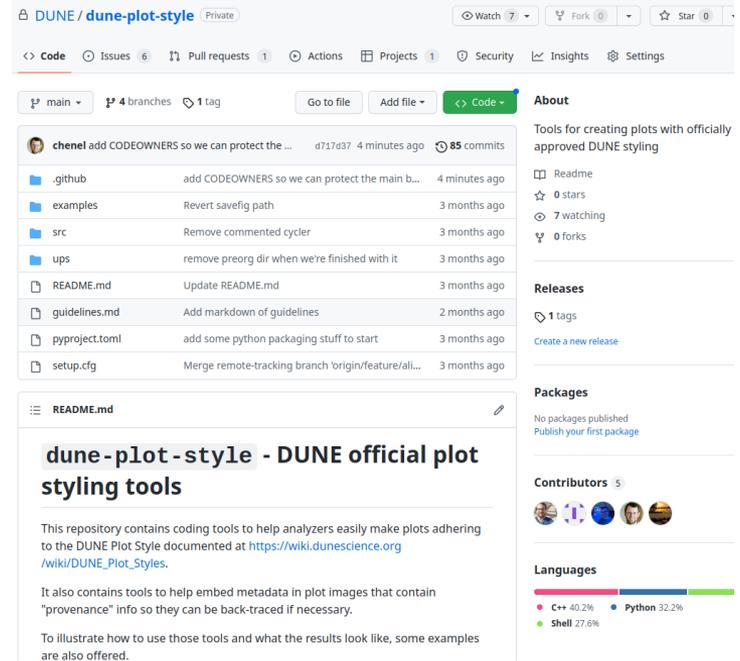
Full proposed guidelines at [this page](#) in `dune-plot-style` GitHub (see also next slide)

What we have

We have a **software package that we submit to APB for recommendation to the collaboration** to aid in following the guidelines.

It contains:

- Header for use with ROOT that
 - applies (most of) the style when `#included`
 - includes functions to do the rest
- Python modules that do the same for PyROOT and Matplotlib
- Documentation page and example scripts that show how to use them
- Machinery to make into a UPS product for easy use on (e.g.) `dune gpvms`
- Machinery to install as a standalone Python package



The screenshot shows the GitHub repository page for `DUNE/dune-plot-style`. The repository is private and has 7 issues, 1 pull request, 1 project, and 1 security issue. It has 4 branches and 1 tag. The file browser shows the following files and their commit dates:

File	Commit Message	Commit Date
<code>.github</code>	add CODEOWNERS so we can protect the main b...	4 minutes ago
<code>examples</code>	Revert savefig path	3 months ago
<code>src</code>	Remove commented cyler	3 months ago
<code>ups</code>	remove preorg dir when we're finished with it	3 months ago
<code>README.md</code>	Update README.md	3 months ago
<code>guidelines.md</code>	Add markdown of guidelines	2 months ago
<code>pyproject.toml</code>	add some python packaging stuff to start	3 months ago
<code>setup.cfg</code>	Merge remote-tracking branch 'origin/feature/all...	3 months ago

The `README.md` file is selected, showing the following content:

dune-plot-style - DUNE official plot styling tools

This repository contains coding tools to help analyzers easily make plots adhering to the DUNE Plot Style documented at https://wiki.dunescience.org/wiki/DUNE_Plot_Styles.

It also contains tools to help embed metadata in plot images that contain "provenance" info so they can be back-traced if necessary.

To illustrate how to use those tools and what the results look like, some examples are also offered.

Releases
1 tags
[Create a new release](#)

Packages
No packages published
[Publish your first package](#)

Contributors 5

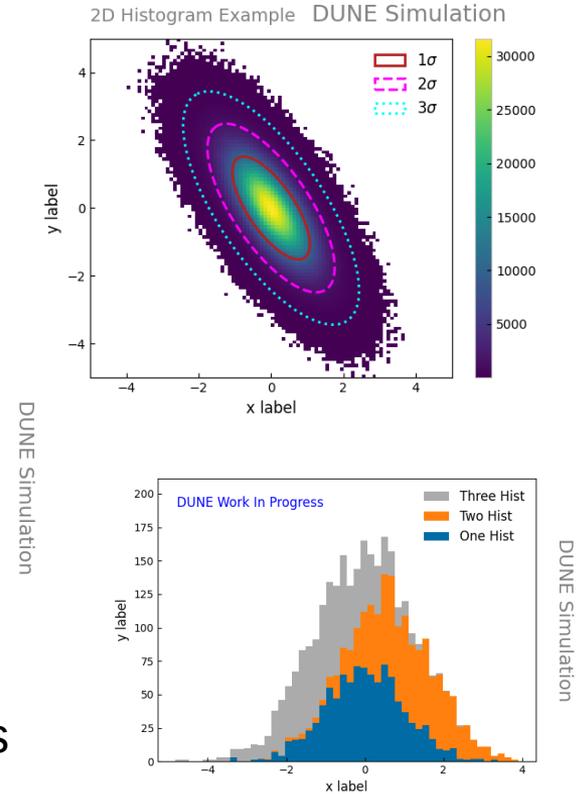
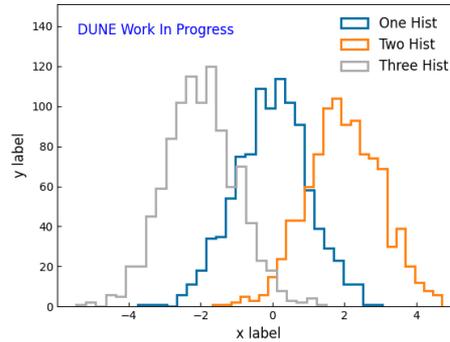
Languages

Language	Percentage
C++	40.2%
Python	32.2%
Shell	27.6%

[<https://github.com/DUNE/dune-plot-style>]

What we have

We have **three flip-book documents** with example plots exhibiting the guidelines using C++ ROOT, PyROOT, and Matplotlib (generated from the example scripts). They're attached to the Indico document.



Some of the example plots

What we need from APB

- Review, discussion, and signoff of the proposed guidelines as “official”
 - ▶ Also review of example plots as necessary
- Review and discussion (if needed), signoff on endorsing the software tools to the collaboration as “official”
- Advertisement to the collaboration—do we need a general “comment period”?
 - ▶ Handling general comment probably be painful (lots of [bikeshedding](#)), but some folks may have useful opinions otherwise not incorporated?