Typeset testing

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Abstract. This is my abstract for this document. It is a summary of everything in the document—though it does not *really* tell you much about what the whole paper is about. Good luck trying to get anything out of this, nerd! Sans!

1. Modern typesetting for the modern type

Much like in writing, the golden rule everyone teaches you is *readability*—many times it is a typographer's job to break that down, and make something eyecatching and unique. This is not one of those times. I need the reader to actually read this.

Luckily for me, there are plenty of readable typefaces. The main type for this document is XCharter—an extended version of Matthew Carter's original Bitstream Charter. Overall, it is *very* readable, and prints out well at just about any resolution, making it perfect for just about any occasion; the typeface also benefits from not being anywhere near as overused as, say, Times—and, unlike Computer Modern, can be read for an extended period of time.

In a supporting role are two other nice typefaces, Inter and `Julia Mono`.

For a while I was under the impression that I had to settle on a mediocre sans serif typeface, but I was wrong—I found Inter. I *love* this typeface so much. Even if it's not the exact design elegance of Frutiger, I absolutely adore this typeface's customizability and general readability. There are a few features here that are sorely missing from

other typefaces, such as an optional serif in the uppercase *I*, curve in the lowercase *l*, and even configurable numbers.

Inter works surprisingly well with Charter. I was actually caught off guard at first how well they work together. There are a few things that I would do differently, like give the *t* a slant, at the top, and make the dots on *i* and *j* square rather than round, but those aspects are negligible; despite the changes I would make, Inter is so perfect that I'm more than content to use it as-is. Honestly, I think this could be the age's new Frutiger—and I don't say that lightly. All it needs is a *proper fuggin' italic*.

`Juilia Mono`, on the other hand, is a simple–though feature rather complete–monospaced typeface. It has, unlike many other monospaced typefaces, *italic*, **bold**, and ***bold-italic*** built in, along with a *ton* of unicode characters. Though, as you can probably tell, the dashes leave something left to be desired–I'll make some modifications to them at some point.

With all of that put together, Julia Mono could be used to typeset entire documents–though I'm not sure if doing all that with a monospaced typeface, for anything other than aesthetics, is the best idea. I don't know–I'll try it out some time.

1.1. Math typesetting

Now we can have some fun with typesetting equations. Obviously, since this is a LaTeX template, it's for people that—at least likely—do *something* with math. There are a few areas that I can test this out in, so, without further ado, I'll get to making some stuff.

Physics. Let's start with the Linblad master equation, a fine choice for starters,[1]

$$\sum_j \gamma_j \left(L_j \rho(r,t) L_j^\dagger - \frac{1}{2} \left\{ L_j L_j^\dagger, \rho(r,t) \right\} \right) - i \left[H, \rho(r,t) \right] - \frac{\partial \rho(r,t)}{\partial t} = 0 \,. \tag{1}$$

As it stands now (2022-08-05), I'm not a huge fan of the sum sign, but oh well—that can change in the future.

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[1] Daniel Manzano, "A Short Introduction to the Lindblad Master Equation," *AIP Advances* 10, no. 2 (February 2020): 025106, https://doi.org/10.1063/1.5115323.

There's also the Laughlin wavefunction,[2] which got Robert Laughlin a Nobel,

$$\psi(z_i) = \prod_{i<j} \left(z_i - z_j \right)^m \exp\left[-\sum_{i=1}^{N} \frac{|z_i|^2}{4\ell_B^2} \right].\qquad(2)$$

It shows up just about everywhere in many-body physics. I can't remember what paper it was, but if memory serves me right—it often doesn't—it appears as the wavefunction for a Tomanaga-Luttinger Liquid as well, which is pretty neat.

The general solution to the Poisson equation is

$$\phi(r) = \frac{1}{4\pi\epsilon_0} \int \frac{n(r')}{|r - r'|}\, d^3r.$$

Which, all things considered, is rather useful.

Synthesizer stuff. The transfer function for a realistic, N-pole Moog transistor ladder filter was derived by Stefano D'Angelo and Vesa Valimaki[3] as

$$H(s) = -\prod_{u=0}^{N-1} \frac{\left(\frac{I_{\text{ctl}}}{4CV_T} \right)^N}{s + \frac{I_{\text{ctl}}}{4CV_T} \left(1 - \sqrt[N]{k}\, e^{i\pi(2u+1)/N} \right)},$$

which is different from Timothy Stinchcombe[4],

$$H(s) = \frac{1}{(s + 1)^4 + k}.$$

Both of these are technically correct—as they're both derived from a linearized analysis of the Moog ladder filter—the key difference is in that D'Angelo and Valimaki's transfer function is about the *poles* of the transfer function, rather than the (normalized) cutoff frequency.

1.2. Code!

This has some pretty decent, albeit incomplete, code typesetting. For example, here's a hello world in Julia.

[2]R. B. Laughlin, "Anomalous Quantum Hall Effect: An Incompressible Quantum Fluid with Fractionally Charged Excitations," *Physical Review Letters* 50, no. 18 (May 1983): 1395–98, https://doi.org/10.1103/PhysRevLett.50.1395.

[3]"Generalized Moog Ladder Filter: Part I–Linear Analysis and Parameterization," *IEEE/ACM Transactions on Audio, Speech, and Language Processing* 22, no. 12 (December 2014): 1825–32, https://doi.org/10.1109/TASLP.2014.2352495.

[4]"Analysis of the Moog Transistor Ladderand Derivative Filters," October 2008, https://www.timstinchcombe.co.uk/synth/Moog_ladder_tf.pdf.

```
println("Hello world")
```

1.3. Some other nifty things

In this template I have some pretty nice looking block quotes.

> He's right. These are some pretty nice looking block quotes.
> —Jeebus

However, for some reason, whenever I put in block quotes, it makes the rules near the abstract act a bit funny. I have no idea why it does that—perhaps it is one of TeX's great mysteries.

2. Wrapping this up a bit

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I would like to thank all the people that have suffered through LaTeX's bullshit—from the overfull hboxes to the arcane syntax—you have all made this accursed template possible.