



# Level up your Jupyter Notebooks with VS Code

PyData Global 2022

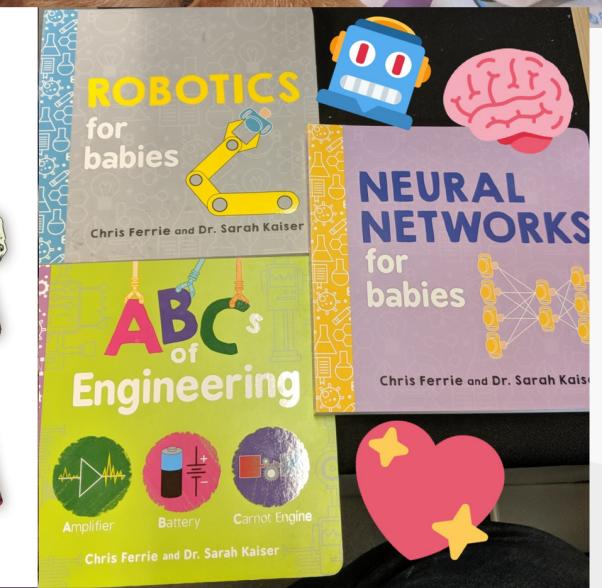
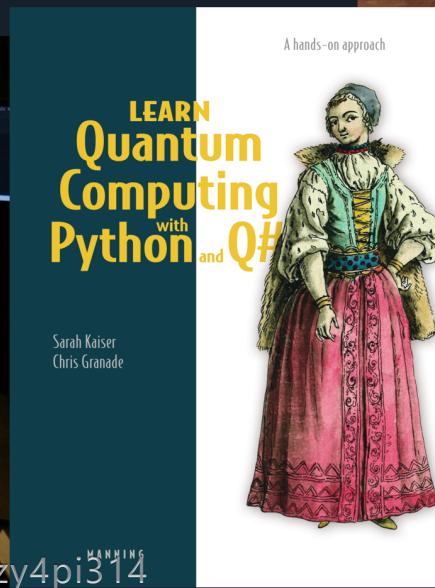
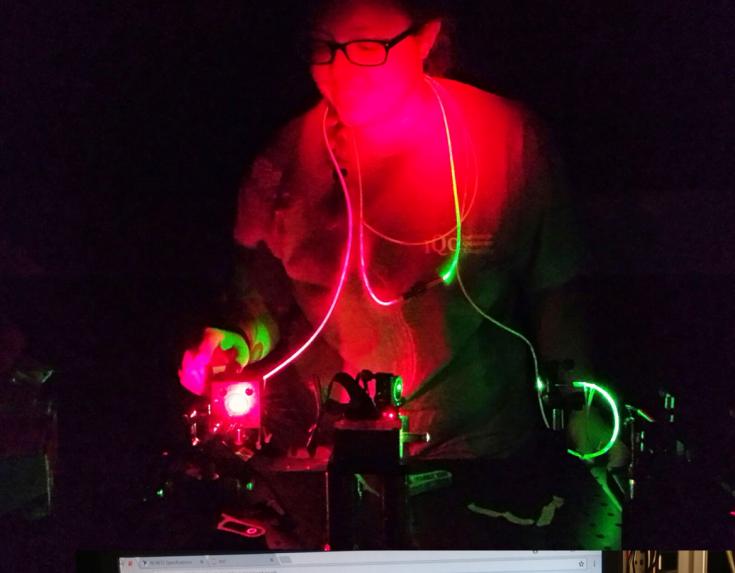
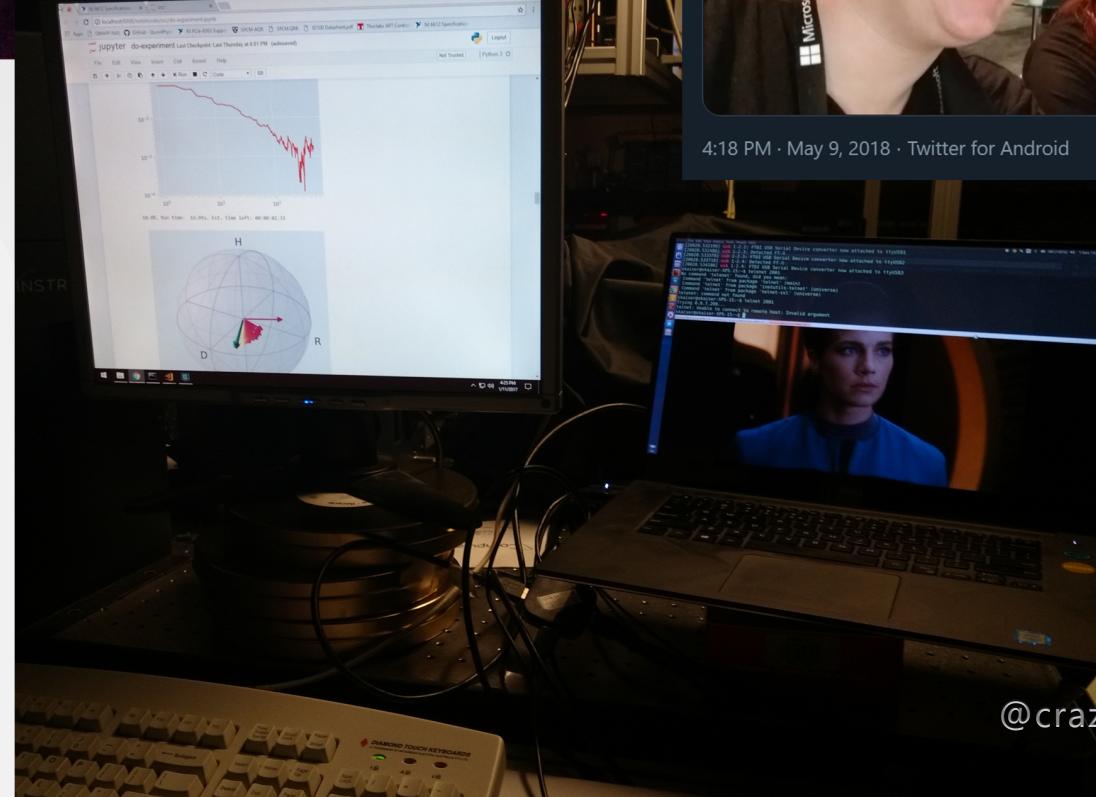
<https://aka.ms/pydataglobal>

@crazy4pi314

# Hi, I'm Sarah!

 Pythonista |  Scientist |  OSS Contributor

Cloud Developer Advocate @ Microsoft



@crazy4pi314



do-experiment

Last Checkpoint: 05/16/2017 (unsaved changes)



File Edit View Insert Cell Kernel Widgets Help

Python [conda env:nova]



## Meaurement model

We can use a set of 5 waveplates to construct measurements which are arbitrary rotations on the bloch sphere.

- $\sigma_z$  rotations for an angle  $\alpha$ :  $\exp(-i\alpha\sigma_y)$

$$U_{QWP}() = \exp\left(-\frac{i\pi}{4}\sigma_z\right)$$

- $\sigma_y$  rotations for an angle  $\alpha$ :  $\exp(-i\alpha\sigma_y)$

$$U_{HWP}(\theta) = \exp\left(\frac{i\theta}{2}\sigma_x\right)$$

$\sigma_x$  rotation

$$\exp(-i\beta\sigma_x) = U_{QWP}^* U_{HWP} U_{QWP}$$

N.B. using the  $\{e_H, e_V\}$  basis

In [5]: *#theta here is the physical rotation angle of the plate, not the resultant state rotation*

```
def hwp(theta):
    arg = 2*1j*theta*qt.sigmay()
    return arg.expm()
def qwp(theta):
    arg = -1*1j*theta*qt.sigmaz()
    return arg.expm()
def Haar():
    # see e.g. http://arxiv.org/abs/math-ph/0609050v2
    z = (np.random.randn(2,2) + 1j*np.random.randn(2,2))/np.sqrt(2.0)
    q,r = la.qr(z)
    d = np.diag(r)

    ph = d/np.abs(d)
    ph = np.diag(ph)

    # canonical state
```

@crazy4pi314

EXPLORER

...

{} devcontainer.json

! environment.yml X

..

## PYDATAGLOBAL2022 [DEV...]

- .devcontainer
- {} devcontainer.json

- Dockerfile

- noop.txt

- > .vscode

- > media

- CODE\_OF\_CONDUCT....

- ! environment.yml

- ghstats.ipynb

- jupyter\_repos.csv

- README.md

- slides.md

! environment.yml

```
1 name: ghstats
2 channels:
3   - conda-forge
4   - defaults
5 dependencies:
6   - python==3.10
7   - numpy==1.23.5
8   - pandas==1.5.2
9   - black==22.10.0
10  - flake8==6.0.0
11  - pandas-profiling==3.5.0
12  - ipywidgets==7.6.5
13  - beautifulsoup4==4.11.1
14  - certifi==2022.9.24
15  - glib==2.74.1
16  - openssl==3.0.7
17  - nbconvert==6.4.4
18  - nbformat==5.5.0
19  - nest-asyncio==1.5.5
20  - networkx==2.8.8
21  - notebook==6.5.2
22  - jupyter_client==7.4.7
23  - colorama==0.4.6
24  - invoke==8.6.0 @crazy4pi314
```

# VS Code is great!

# **But what if we could combine them??**

👉 the best of VS Code, now in Jupyter notebooks

