

Root

a guide for absolute beginners

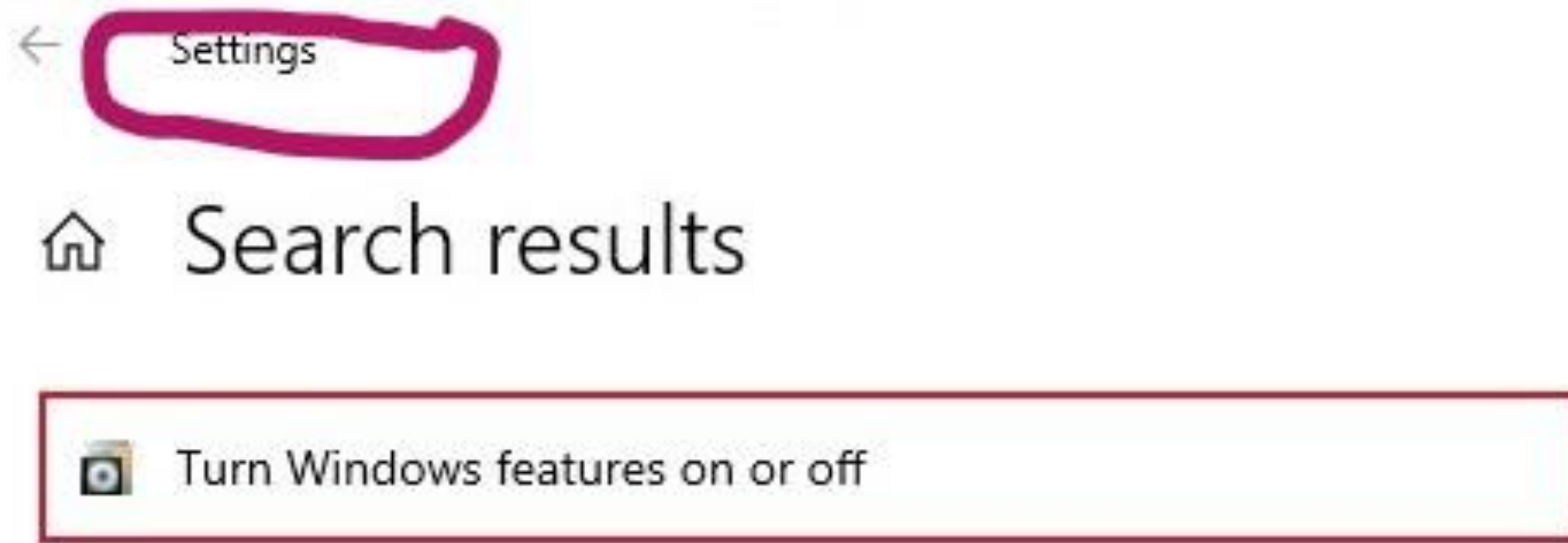
Chris Jillings



First – a few slides about using Linux from Windows...



Ubuntu and X11

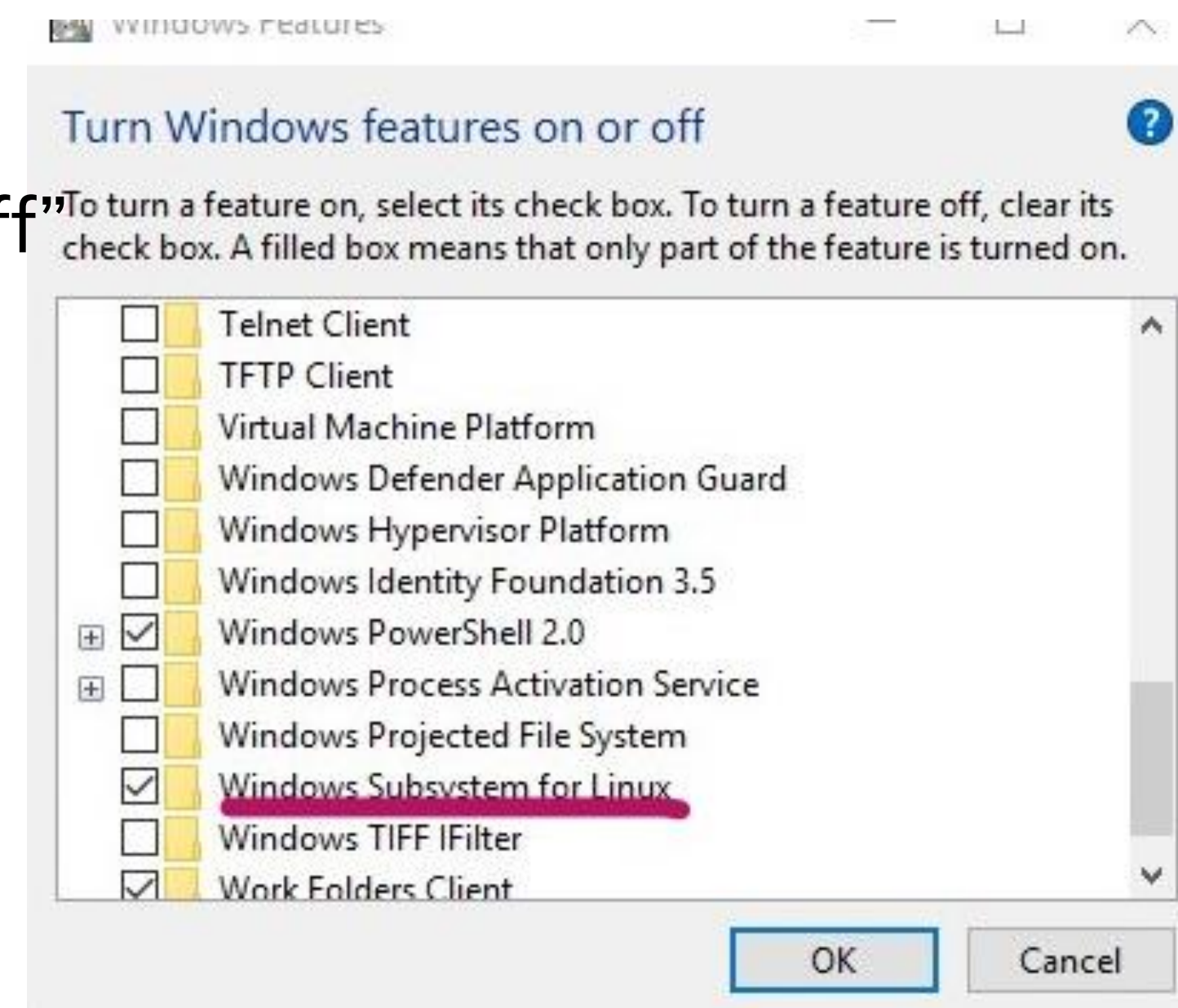


Start by “turning on” Windows subsystem for Linux.

Use Settings – search on “turn windows features on or off”

You need admin privileges.

Use WSL2 – it is much improved.



Install the Ubuntu App from Microsoft

This should be easy.

In WSL2 it is possible to have the Windows 10 filesystem mounted. This is great for copying over image files and the like for uploading/emailing/posting to slack.

Setup



Install VcXsrv (in Windows 10)
(Windows 11 has this built in. I haven't tried it.)

In Ubuntu

```
sudo apt-get update
```

~~(Install lxde—a lightweight windows environment
———sudo apt-get install lubuntu-desktop~~

~~run single-rooted x-screen from xlaunch
Run ubuntu app in Windows.
Launch xterm
Type startlxde from xterm)~~

I now run vcXsrv without any rooted windows.

I use windows Terminal.

install the development environment on Ubuntu:

```
sudo apt-get update  
sudo apt-get install build-essential
```

install the Gnu Scientific Library

```
apt-get install libgsl-dev
```

- Was able to install Root6 binaries by downloading correct tgz file from root.cern.ch



The good way to connect to Compute Canada / SNOLAB nearline

If you need to work efficiently and interactively on CC sites,

read this:

<https://docs.compute canada.ca/wiki/VNC>

Let compute Canada run the graphics itself.

You login and view/edit the screen.

It is much faster than sending the graphics instructions over the net.

You must create a secure tunnel so no one can snoop or use your connection to do something nasty.

Get help from an experienced unix user in your group. The first time you do this it will seem complicated.

~~2020-05-09 2021-05-05 2022-01-10 2022-05-05~~

Root

a quick guide

Chris Jillings

SNOLAB Research Scientist



What this isn't

A polished talk with slides with nice graphics

What this is

A sit-down explanation in which I work through examples
“beside you” explaining how they work.

Root Docs

- <https://root.cern.ch>
- If you don't like my tutorial, start here: https://root.cern.ch/get_started
and here: <https://cds.cern.ch/record/2030598>
(3-hour intro given at CERN in 2015)
- The Root Users' Guide is good.
- A walk through the reference guide.

The Three Virtues of the Computer Programmer

- Laziness,
- Impatience, and
- Pride

(by Larry Wall, who invented the Perl programming language)

Simple Running

```
root
.x HTJI.C
.q
root -l
root -b -q -l HTJI.C
root -b -q -l "HTJI2.C(\"Hello world.\")"
```

HTJI2.C and HTJI2aclic.C

Histograms and file i/o

histograms1.C

histograms2.C

histograms3.C

histograms4.C

Functions and Parameters

functions1.C

Ntuples and

Trees

ntuple1.C

trees1.C

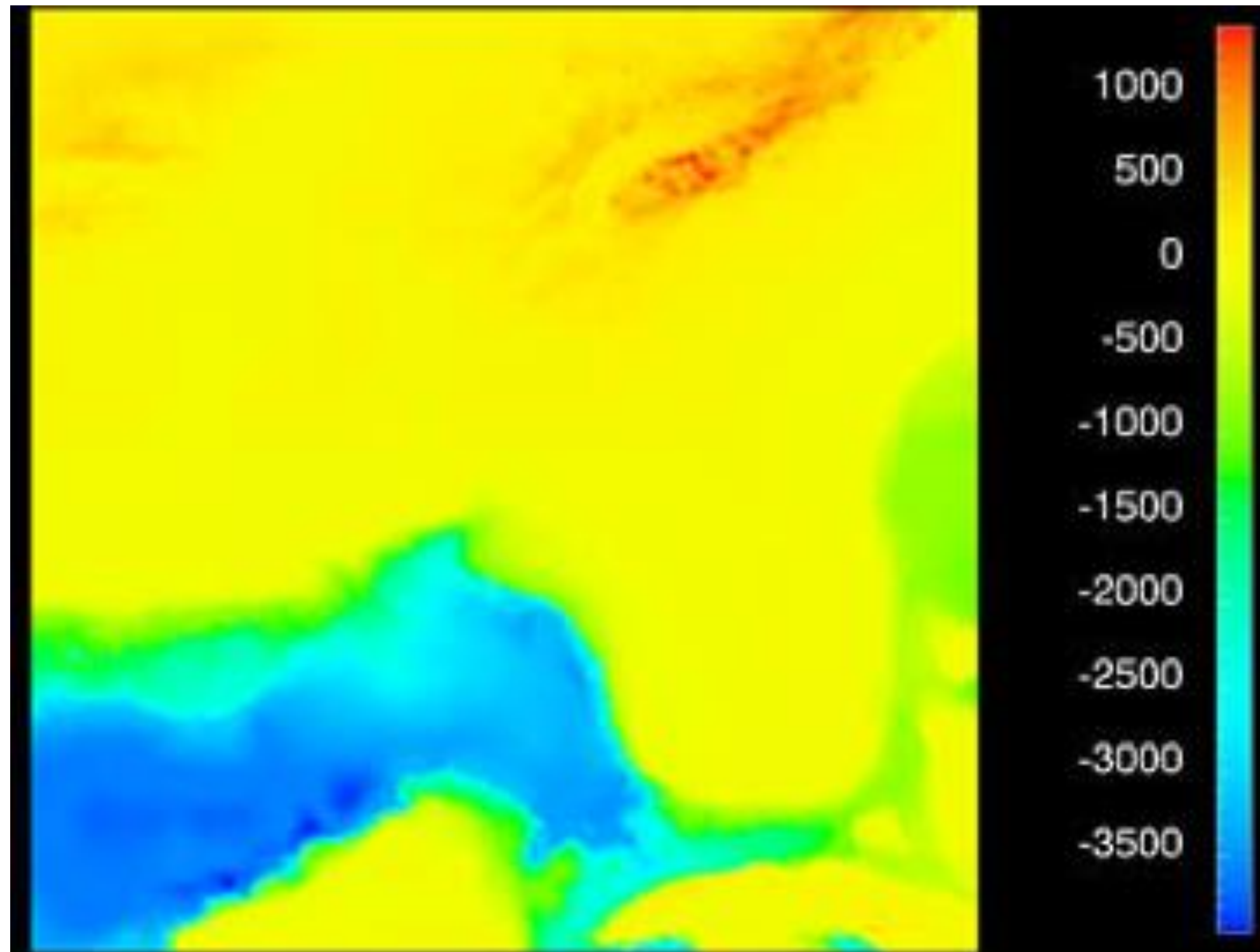
Colors

(the spellings in Root are American)



What is this?

<https://root.cern.ch/rainbow-color-map>



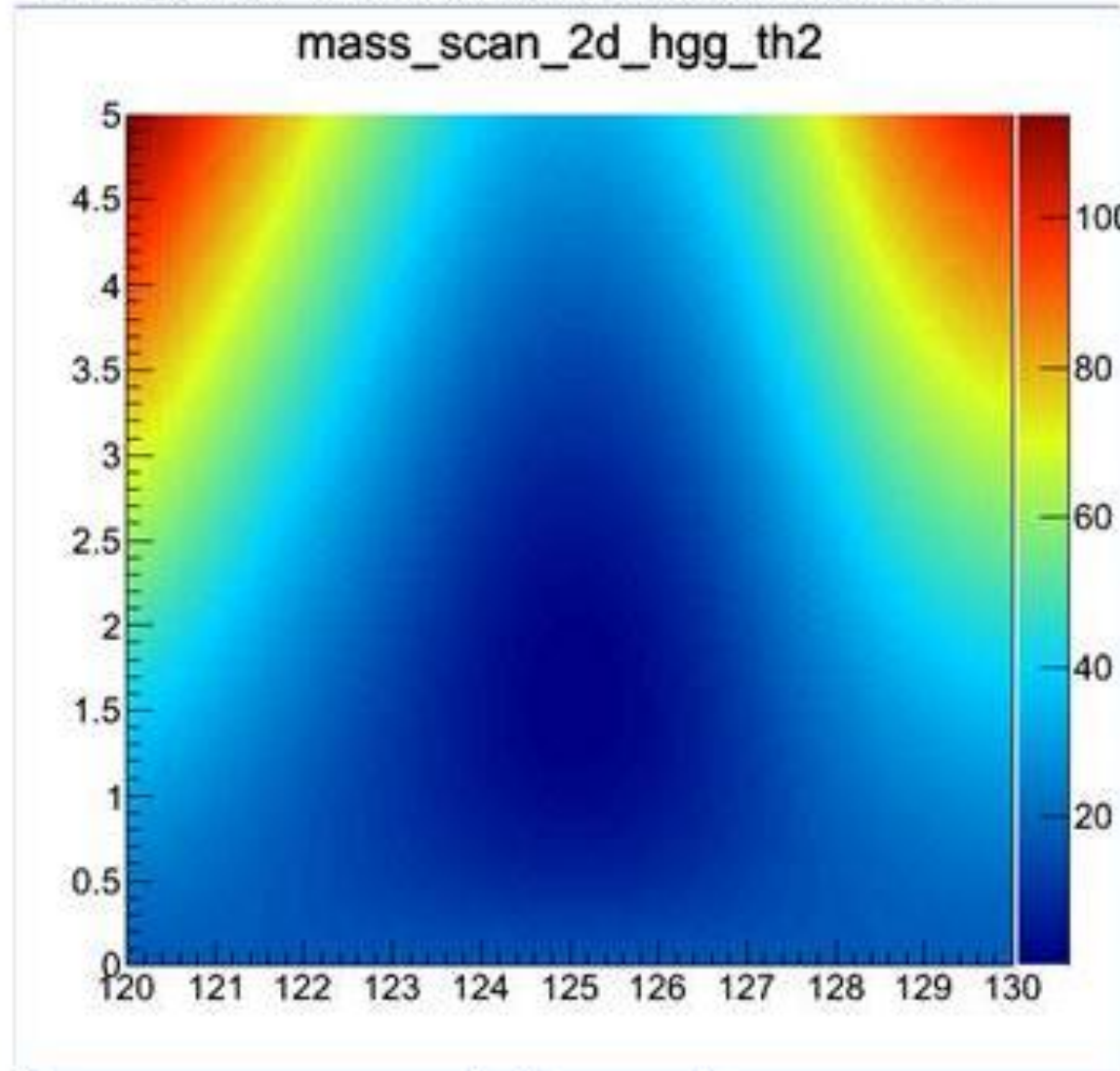
What is this?

<https://root.cern.ch/rainbow-color-map>

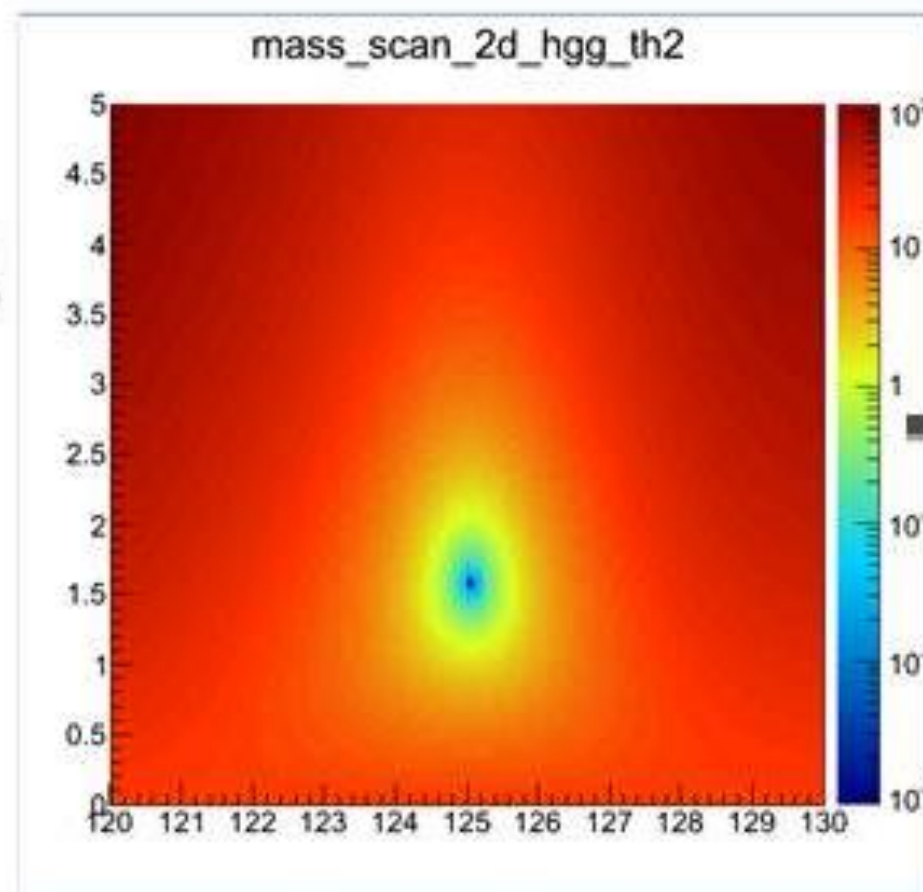
Choosing bad colors results in misinformation!

If you use Root's default rainbow color wash, you will almost certainly get a bad color map.

Original Visual Representation

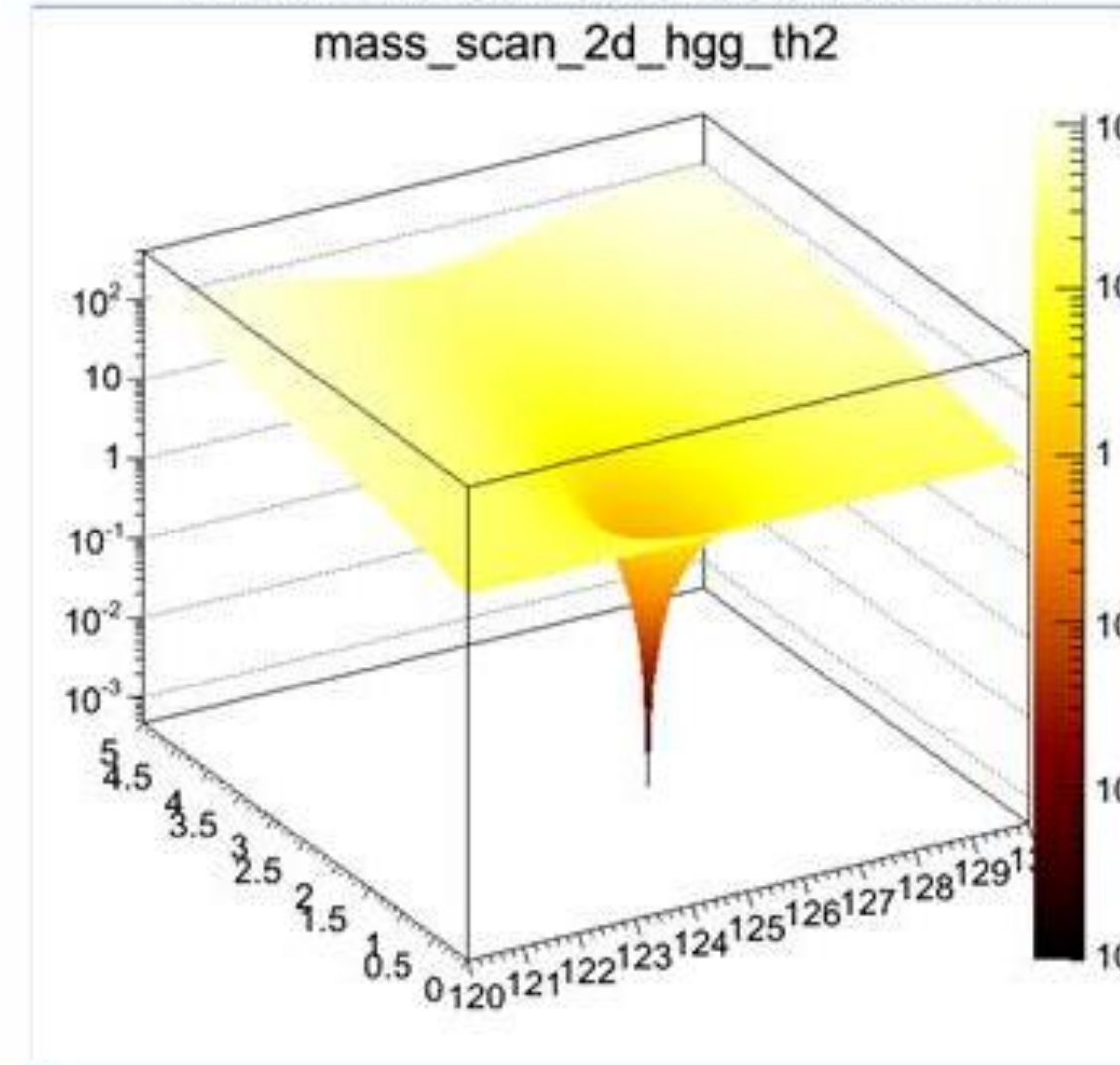


Step 1: Rainbow Colormap

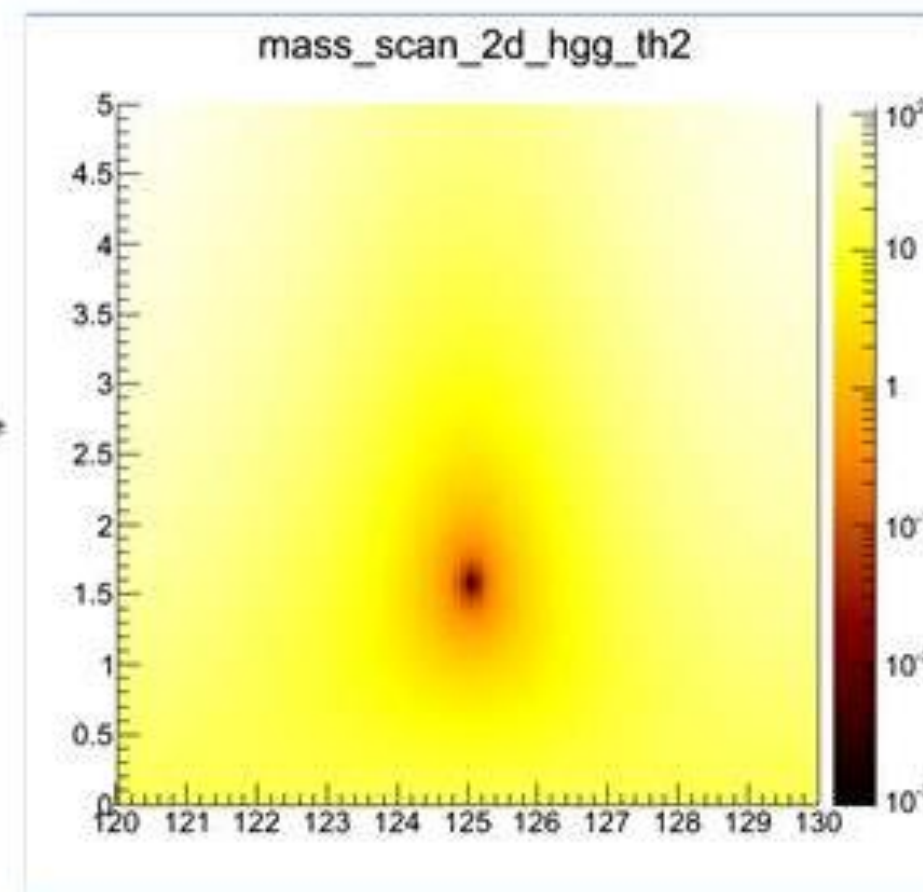


Step 2: Log transform data

Final Visual Representation



Step 4: Create a surface



Step 3: Perceptual Colormap

Root's example of moving from bad to good coloring

<https://root.cern.ch/rainbow-color-map>

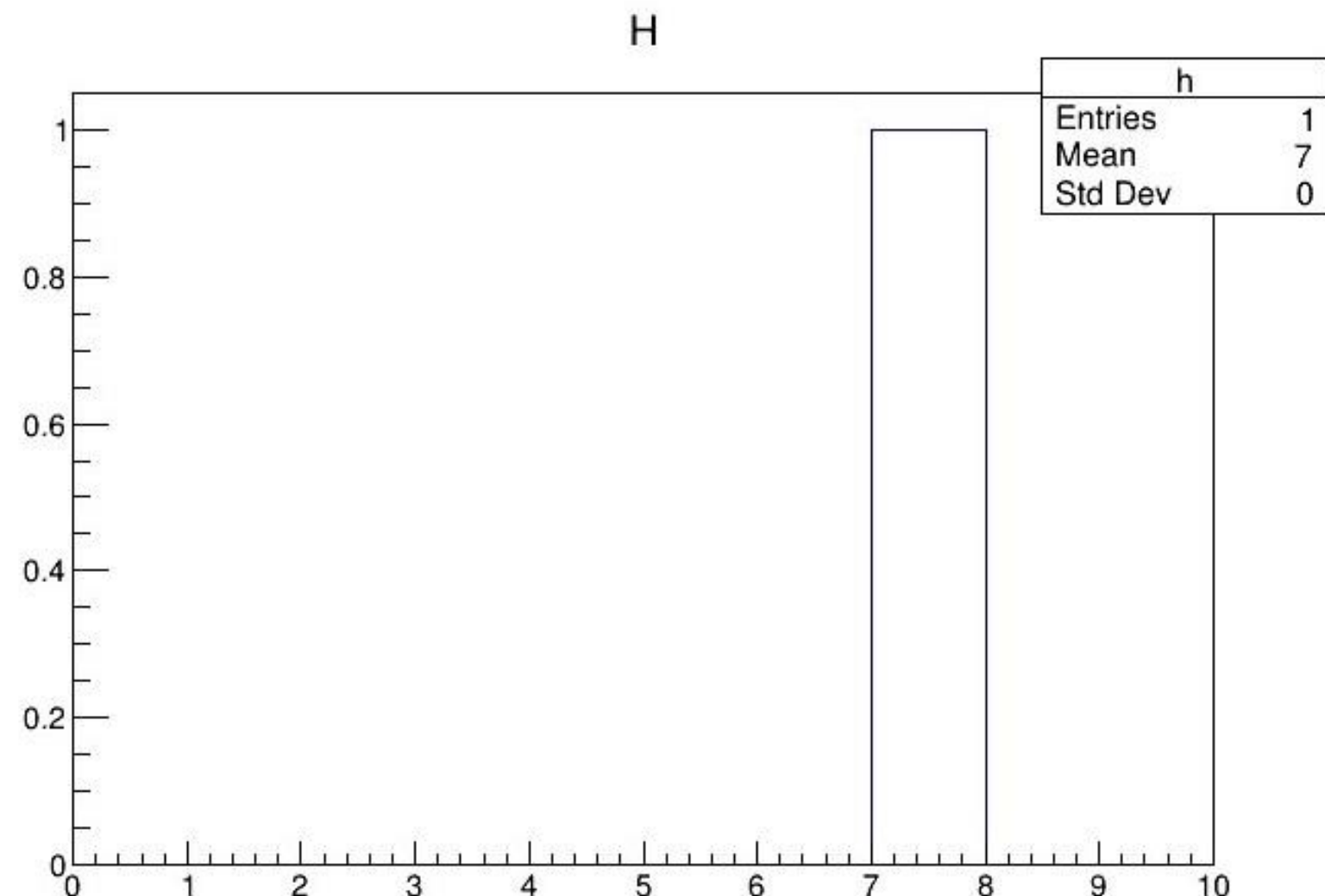
Root 6 Works in Jupyter Notebook

jupyter Untitled3 Last Checkpoint: 5 minutes ago (autosaved) Logout

File Edit View Insert Cell Kernel Widgets Help Trusted | ROOT C++

Run Stop Refresh Code

```
In [1]: TCanvas* c1 = new TCanvas("c1","c1",1);
        TH1F* h = new TH1F("h","H",10,0,10);
        h->Fill(7);
        h->Draw();
        c1->Draw();
```



h	
Entries	1
Mean	7
Std Dev	0

In []:

<https://root.cern.ch/how/how-use-root-notebook>

aClic

Root has a built in compiler for macros.

Needed for some STL structures, at least in Root 5.

Speeds up code:

HTJl2aclic.C

Adding a Class to Root

- briefly mentioned. Out of scope

Write your class

Include special macros in .hh and .cc file

Teach root the class exists: Linkdef file

Compile

A decorative pattern of blue dots of varying sizes and colors (light blue, medium blue, dark blue) arranged in a grid-like pattern at the bottom of the slide.