

# Root

a guide for absolute beginners

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Chris Jillings

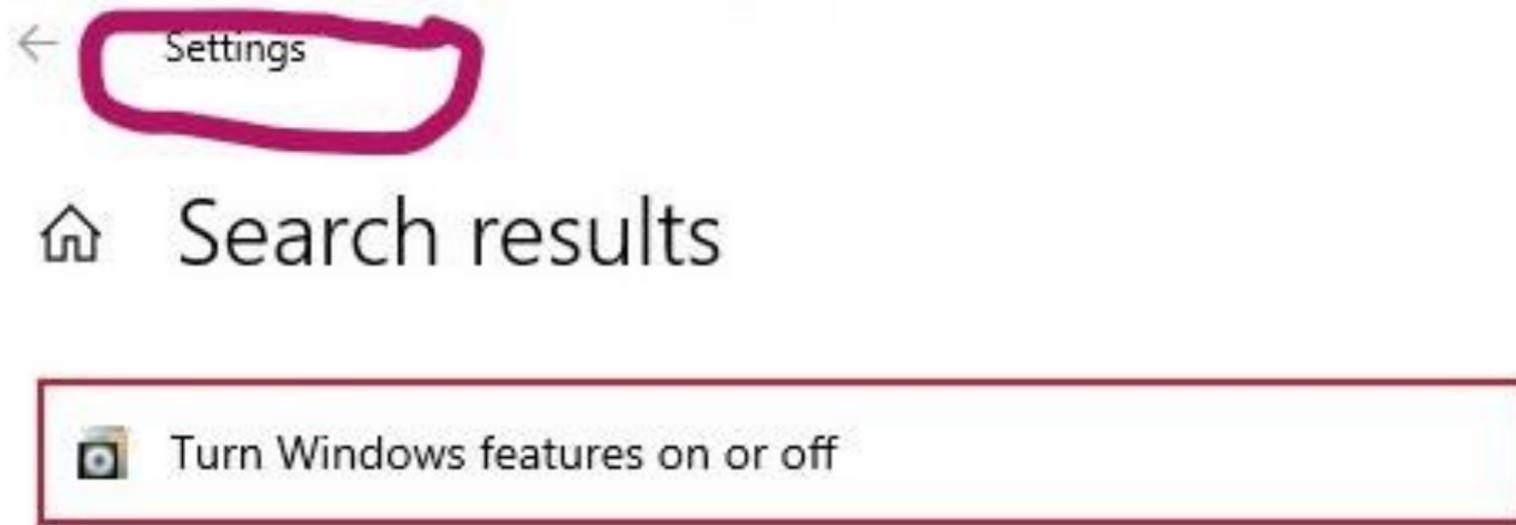


# First – a few slides about using Linux from Windows...

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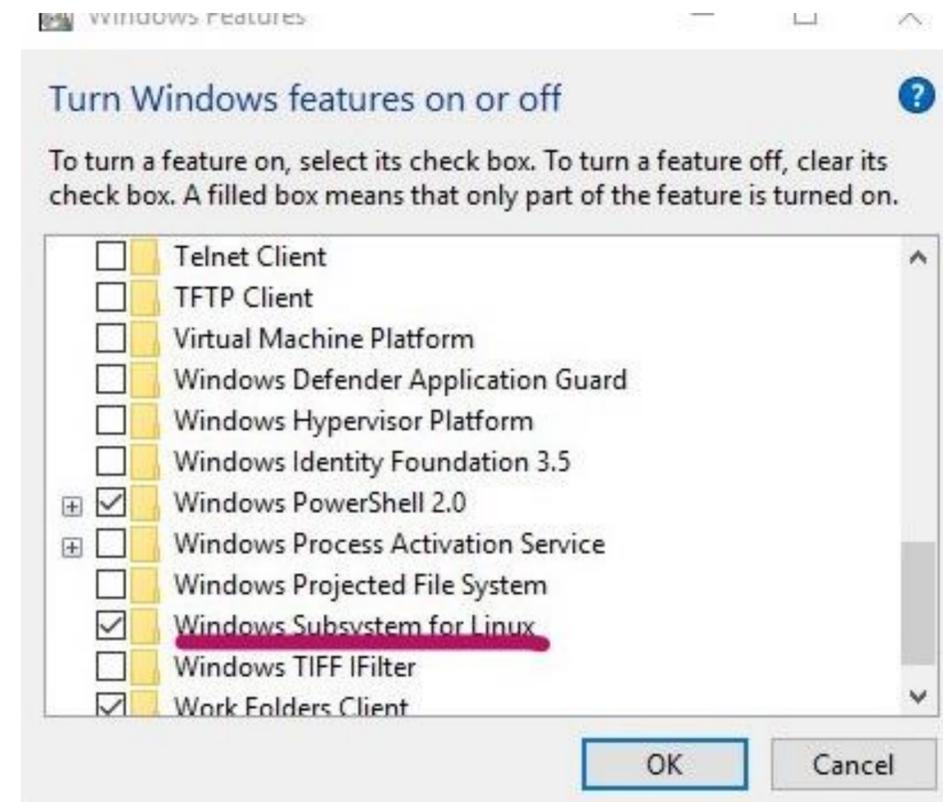
# Ubuntu and X11



**Start by “turning on” Windows subsystem for Linux.**

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

You need admin privileges.



# Install the Ubuntu App from Microsoft

This should be easy.

Note – your Ubuntu file system does *\*not\** share files with your Windows file system. Do not get “smart” and find the unix file system in Program Files. Just Don’t.

# Setup



Install VcXsrv (in Windows)

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

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](http://root.cern.ch)



# The good way to connect to Compute Canada

**If you need to work efficiently and interactively on Graham,**

**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.

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# Root a quick guide

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## 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.

# The Three Virtues of the Computer Programmer

- Laziness,
- Impatience, and
- Pride

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

# Root Docs

- <https://root.cern.ch>
- If you don't like my tutorial, start here: <https://root.cern.ch/getting-started>
- <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.

# Simple Running

---

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

# Histograms and file i/o

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histograms1.C

histograms2.C

histograms3.C

histograms4.C

# Functions and Parameters

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functions1.C

# Ntuples and Trees

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ntuple1.C  
trees1.C

# Colors

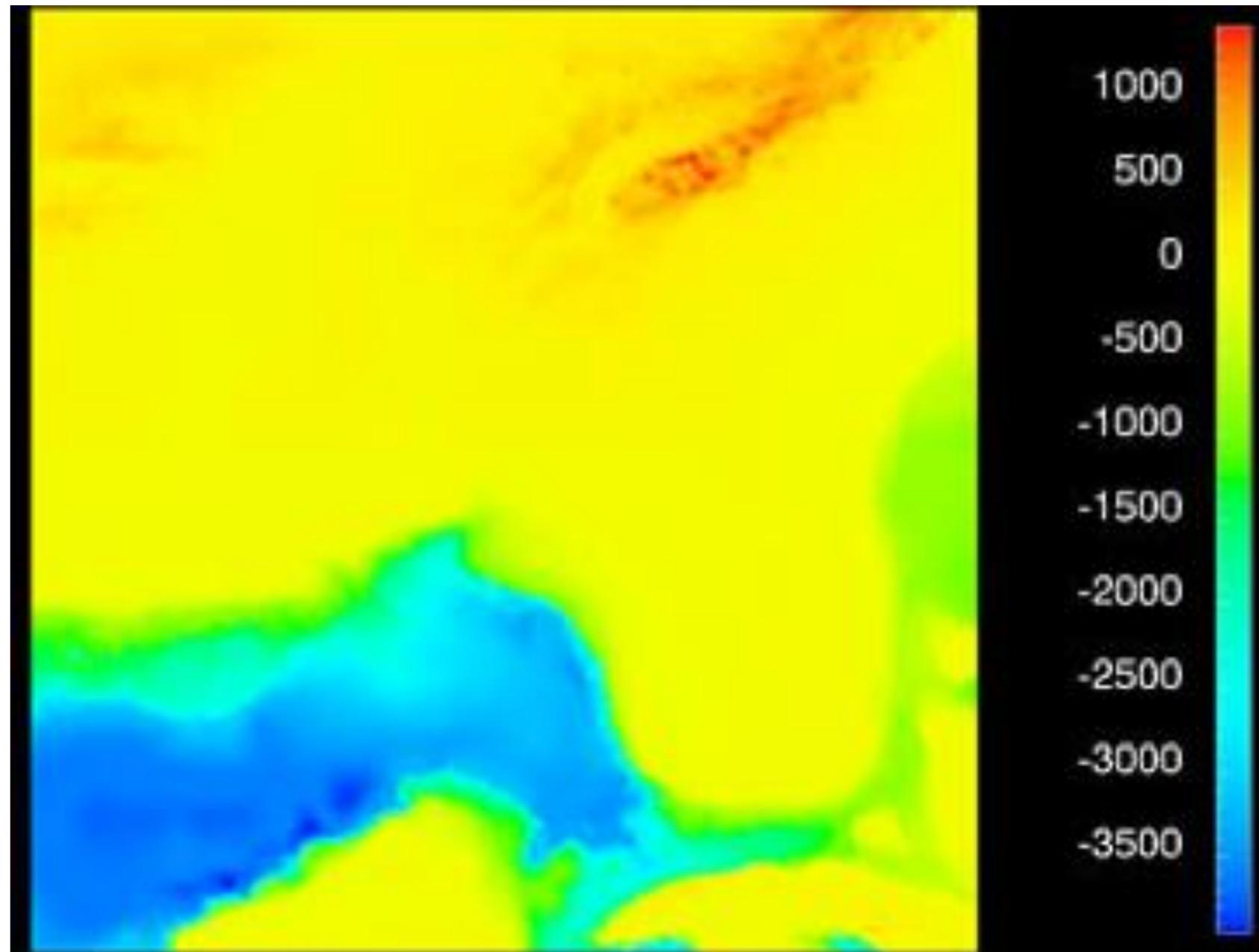
(the spellings in Root are  
American)

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# What is this?

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



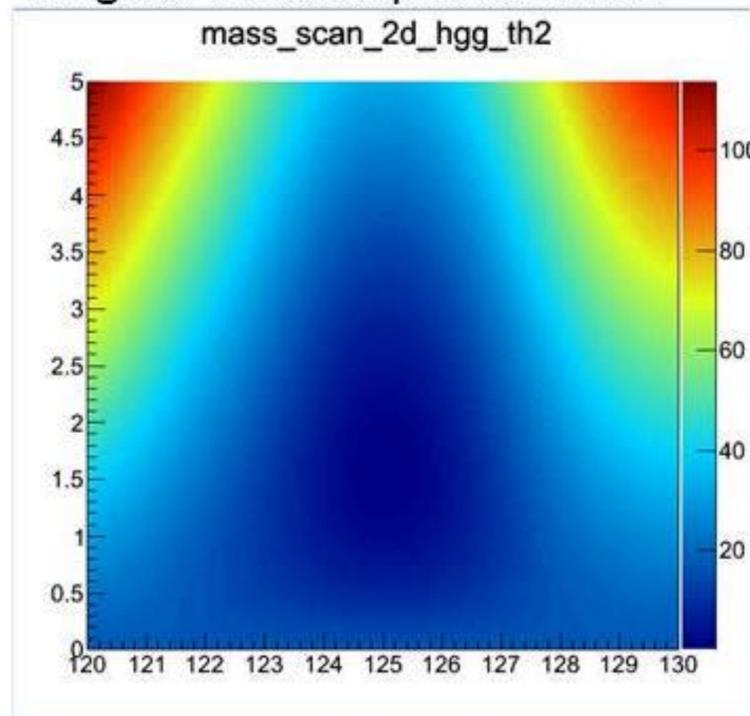
# What is this?

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

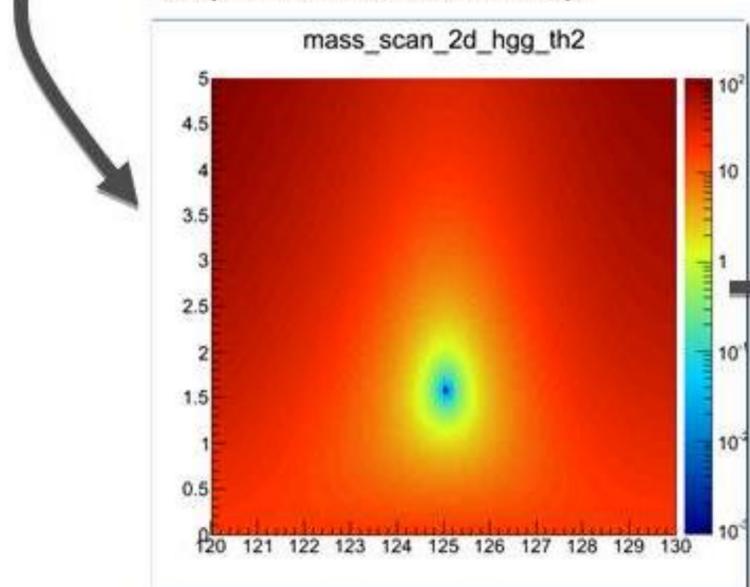
**Choosing bad colors results in misinformation!**

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

Original Visual Representation

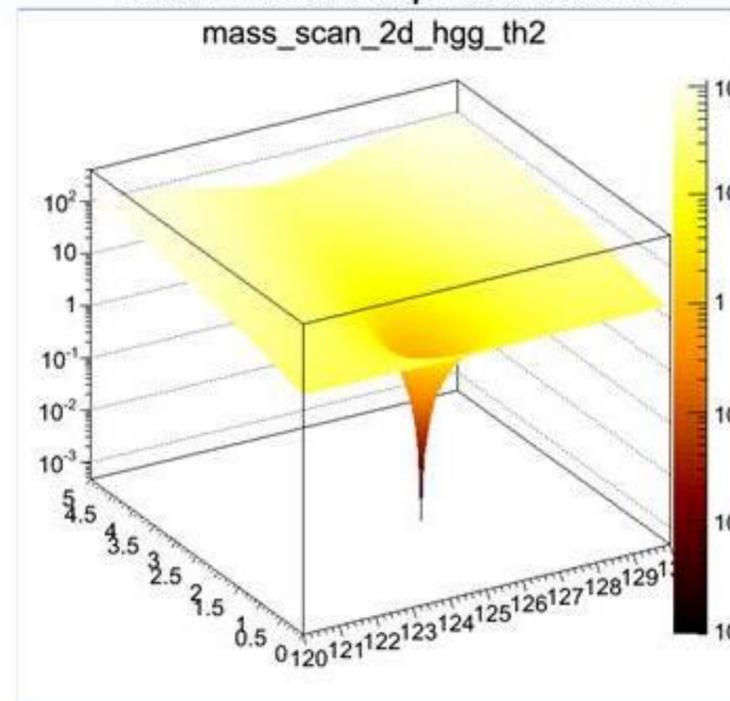


Step 1: Rainbow Colormap

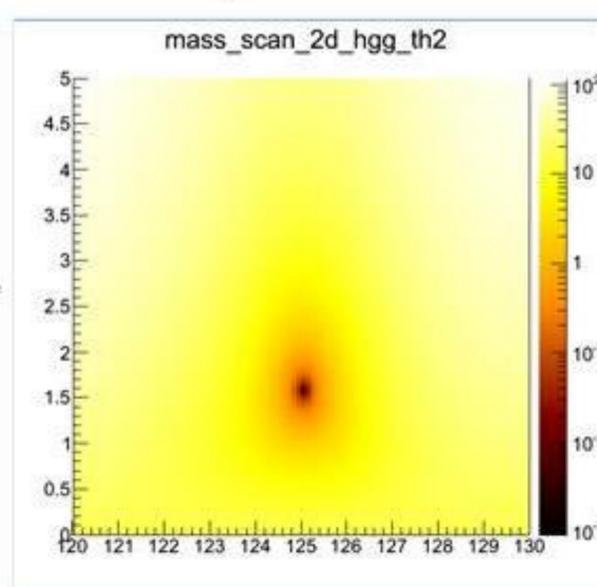


Step 2: Log transform data

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>

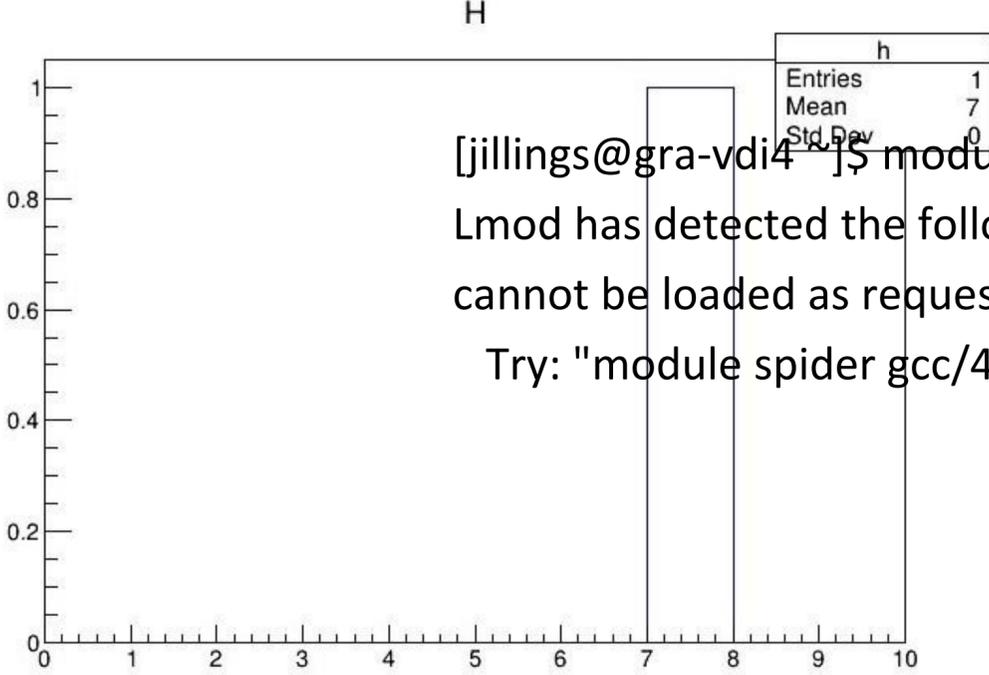
# Root 6 Works in Jupyter Notebook

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

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

Run 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

[jillings@gra-vdi4 ~]\$ module load gcc/4.8.5  
 Lmod has detected the following error: These module(s) exist but cannot be loaded as requested: "gcc/4.8.5"  
 Try: "module spider gcc/4.8.5" to see how to load the module(s).

In [ ]:

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

# aClic

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Root has a built in compiler for macros.

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

I have never used it in Root 6.

(Show function example on graham)

# Adding a Class to Root

- briefly mentioned. Out of scope

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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.