Numerical Methods
Lesson 2

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Goals for this Lesson

- Create and use a git account
- Learn how to visualize data
  - TH1F
  - TCanvas
- Learn how to fit 1D data
  - TF1 and TH1F
  - Fit parameters: initialize and results

git

- Create your own account: https://github.com
- Create your first repository from browser
  - Include README file option
- Configure: ~/.gitconfig
- Checkout your new repository
  - git clone <repository link>
- Create and upload a test file into your repository
  - touch file.txt
  - git add file.txt
  - git commit –m “message”
  - git push

.gitconfig

- Create the file in your home: ~/.gitconfig
- With contents similar to the following (replace your id):

```
[user]
        name = Jose
        email = jose.benitez@cern.ch
        github = benitezj
        gitlab = benitezj
[core]
        excludesfile = /home/benitezj/.gitignore
        editor = "/usr/bin/emacs "
```

ssh keys

- Go to your ssh config dir:
  `cd ~/.ssh`
- Generate keys
  `ssh-keygen`

Just press enter two times, password not needed

- Load the contents of id_rsa.pub into your git settings page:
  github.com → Settings → SSH and GPG Keys → New SSH Key

Code for today's lesson

- Check out repository here: https://github.com/benitezj/MetodosNumericosCourse

- In your home directory

```
git clone git@github.com:benitezj/MetodosNumericosCourse.git
```

Visualize data

Learn how to use ROOT objects:

- TH1F
- TCanvas

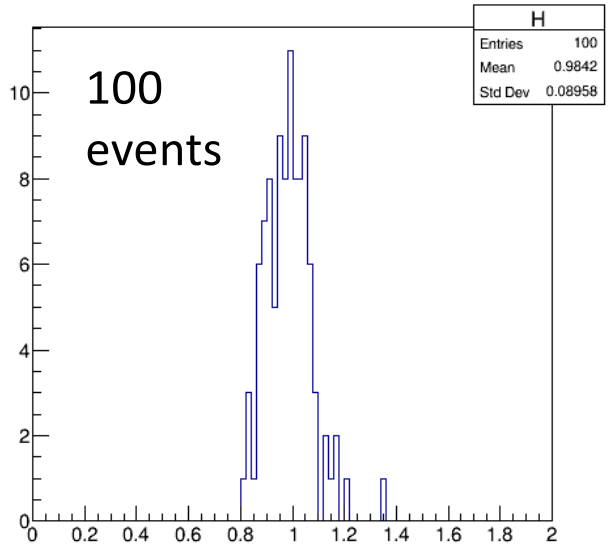
Execute Lesson2/example1.C

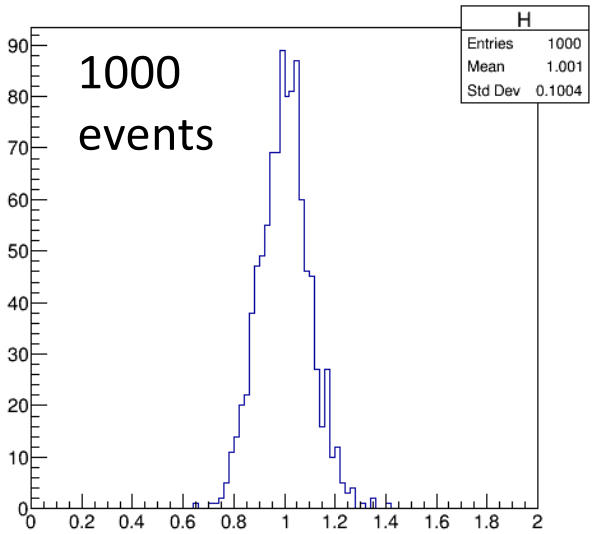
- Compare results with
  - 100 events (Lesson1.dat)
  - 1000 events (Lesson2.dat)

What is the meaning of the graph?

- Graph properties:
  - Entries
  - X-axis
  - Y-axis
  - Bins:
    - How many?
    - Bin width arbitrary ?
  - Stats box: Mea, Std Dev.

- X is a Random variable
  - Values are randomized
  - Values have probabilities





Compare to model

- Data was generated with Gaussian model with parameters (Lesson1/example2.C):
  - Mean = 1.0
  - Sigma = 0.1
- Why TH1F distribution parameters (stats box Mean and Std. Dev.) have different values?
- Why 1000 events gives closer parameters to model?

Saving data in root files

- TFile

Save the TH1F object into a TFile

- Lesson2/example1.C: read Part 4 code
- Uncomment Part 4 and execute
  - Should produce file: Lesson2_example1.root

Reading a root file

- Execute Lesson2/example2.C
  - Only Parts 1 and 2 to create same graph as Lesson2/example1.C

Fitting distributions

- Execute Lesson2/example2.C Part 3
  - Check fit results printed on screen
  - Do they agree with the original model?
  - Do they depend on how the parameters are initialized for the fit? (try modifying those)

Proper graph labels

- Read, understand, and execute: Lesson2/example2.C Part 4