Status of the ROOT-based analysis framework

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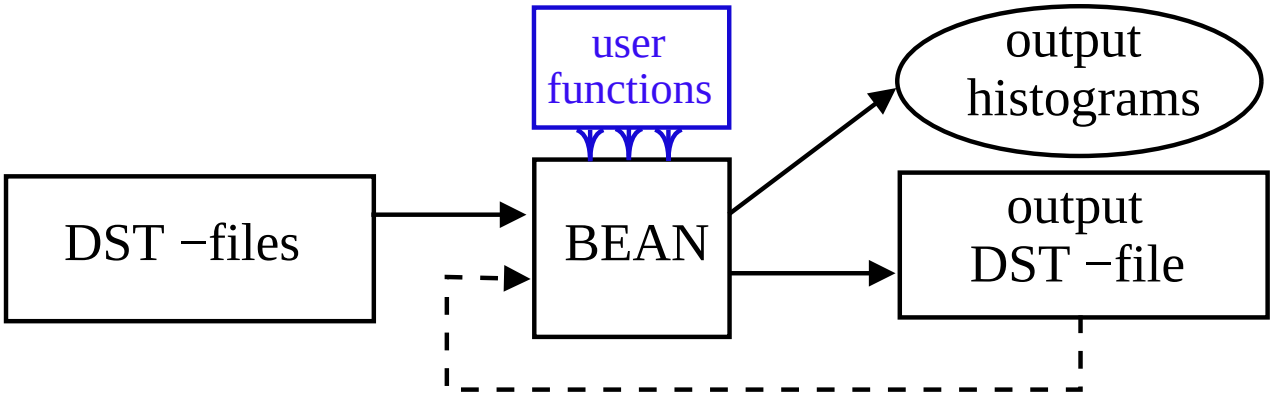
ROOT-based analysis framework



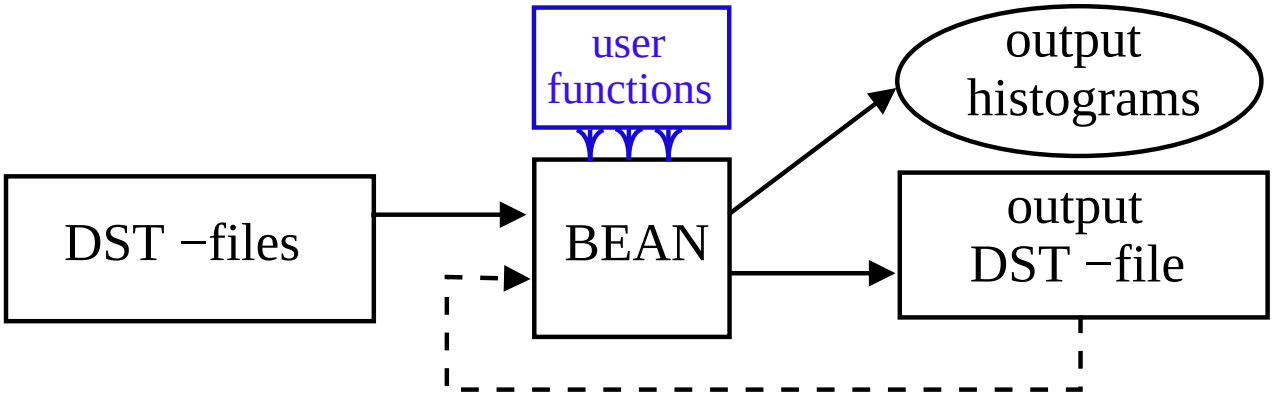
"BEAN" is a simple tool for:

- analysis of the data (DST)
- event filtration
- development new code

User Functions:

- are in the "BeanUser" directory
- compiled into a dynamic library
- provide documented examples

ROOT-based analysis framework



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Analysis tools

Several analysis packages have been adapted from BOSS:

- Particle ID
  - TestPID (example of user function)
- Magnetic Field
  - MagField (example of user function)
- Kinematic Fit & Vertex Fit
  - Rhopi (RhopiAlg accommodated for BEAN)

Verification

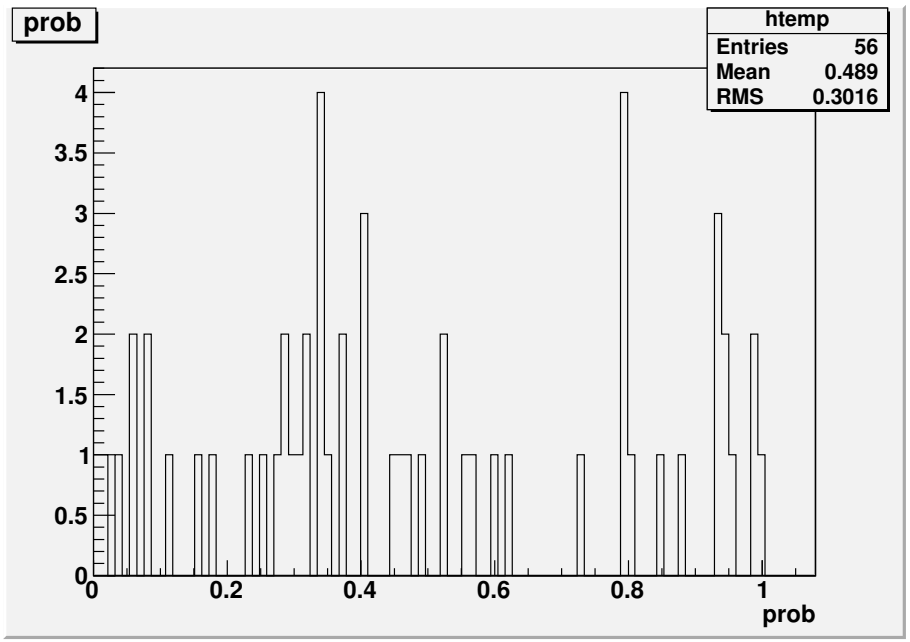
We used Rhopi example to verify the correctness of these packages.

- BOSS version 6.5.2
- standard options for generating the set of $\rho\pi$ events (`jobOptions_sim.txt; jobOptions_rec.txt`)
- BOSS RhopiAlg (`jobOptions_ana_rhopi.txt` with disabled AbsCor)
- BEAN Rhopi

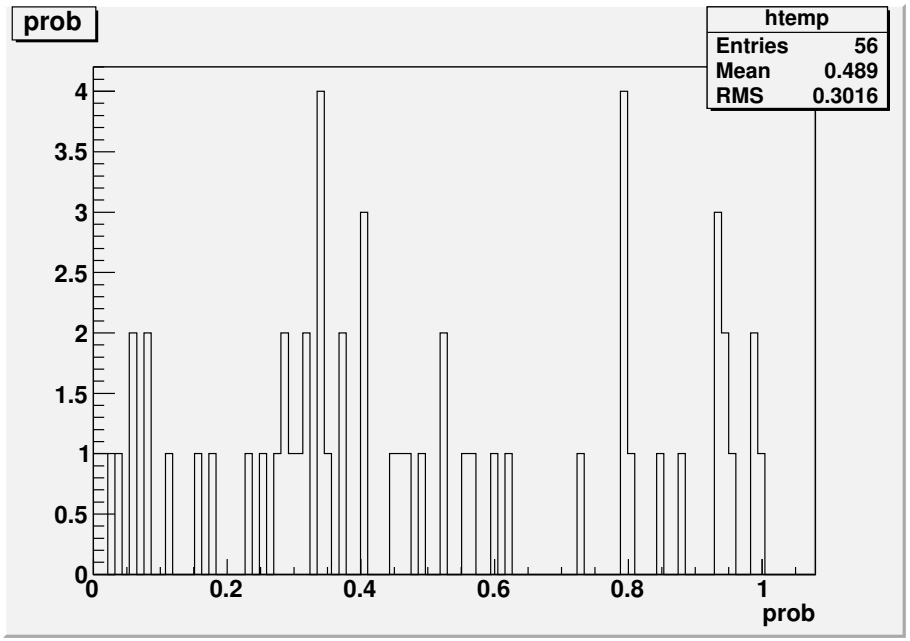
Validation of ParticleID

The probability that a particle is a pion:

BOSS:



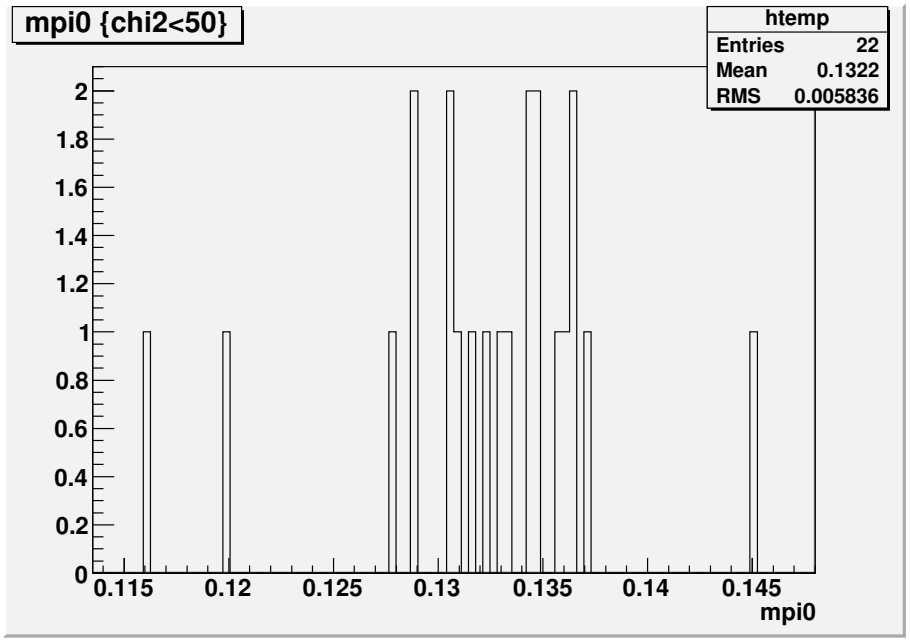
BEAN:



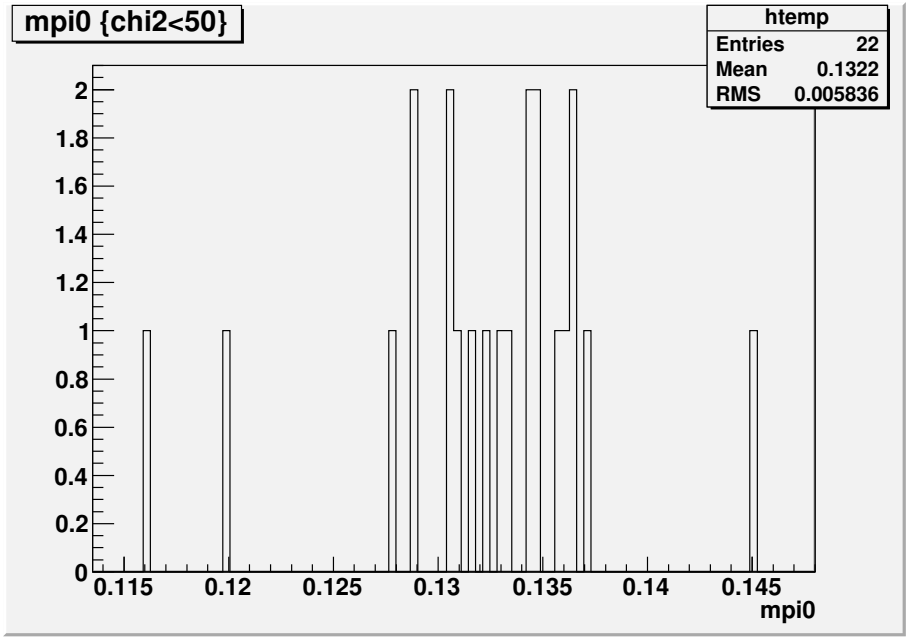
Validation of Kinematic Fit

- Kinematic 4C fit: mass of π^0

BOSS:



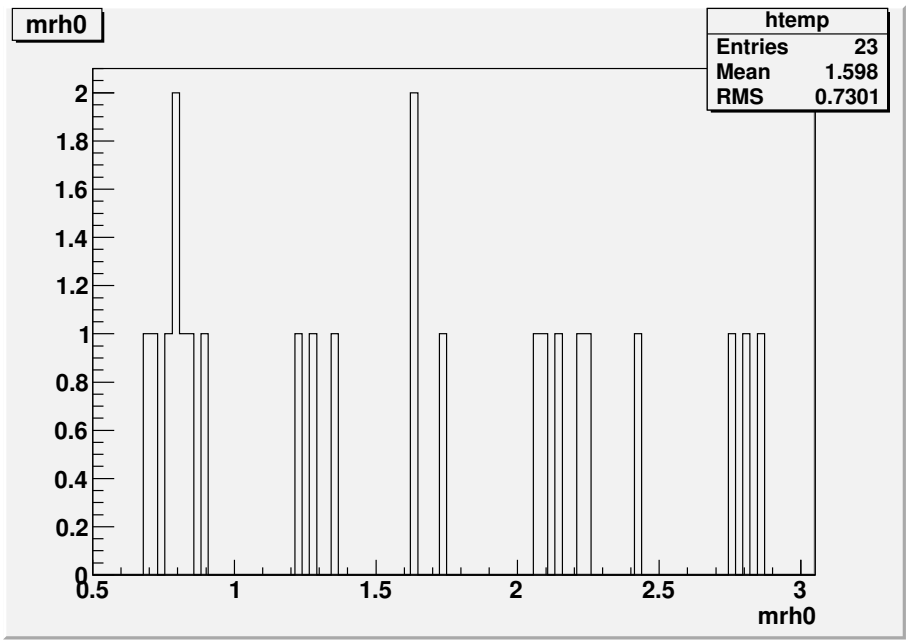
BEAN:



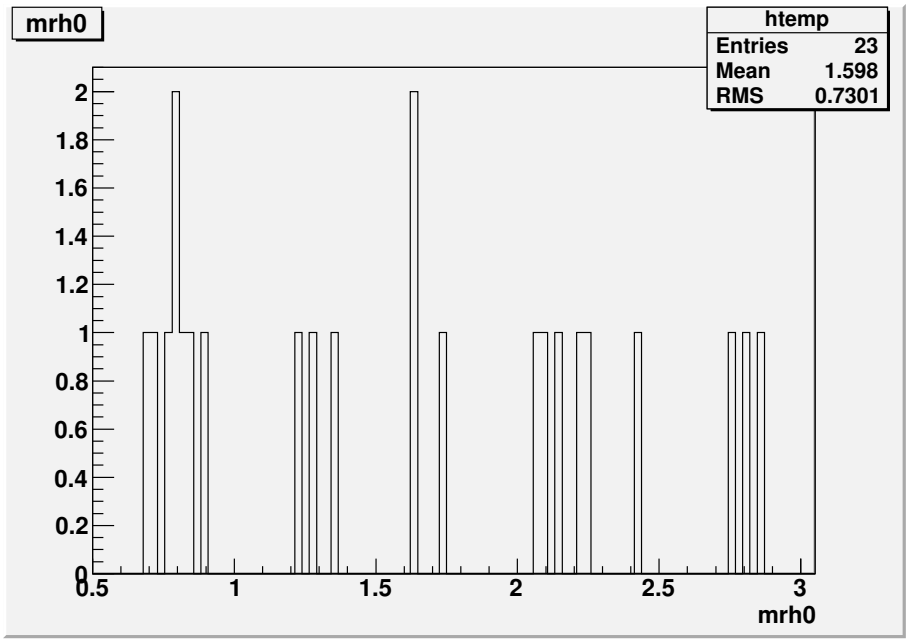
Validation of Kinematic Fit

- Kinematic 5C fit: mass of ρ^0

BOSS:



BEAN:



ToDo

- Data base interface (sqlite)
- Other analysis tools from BOSS software PhotonCor/AbsCor, BesDChain ...
- Extensive testing
- Documentation

- PROOF (The Parallel ROOT Facility)

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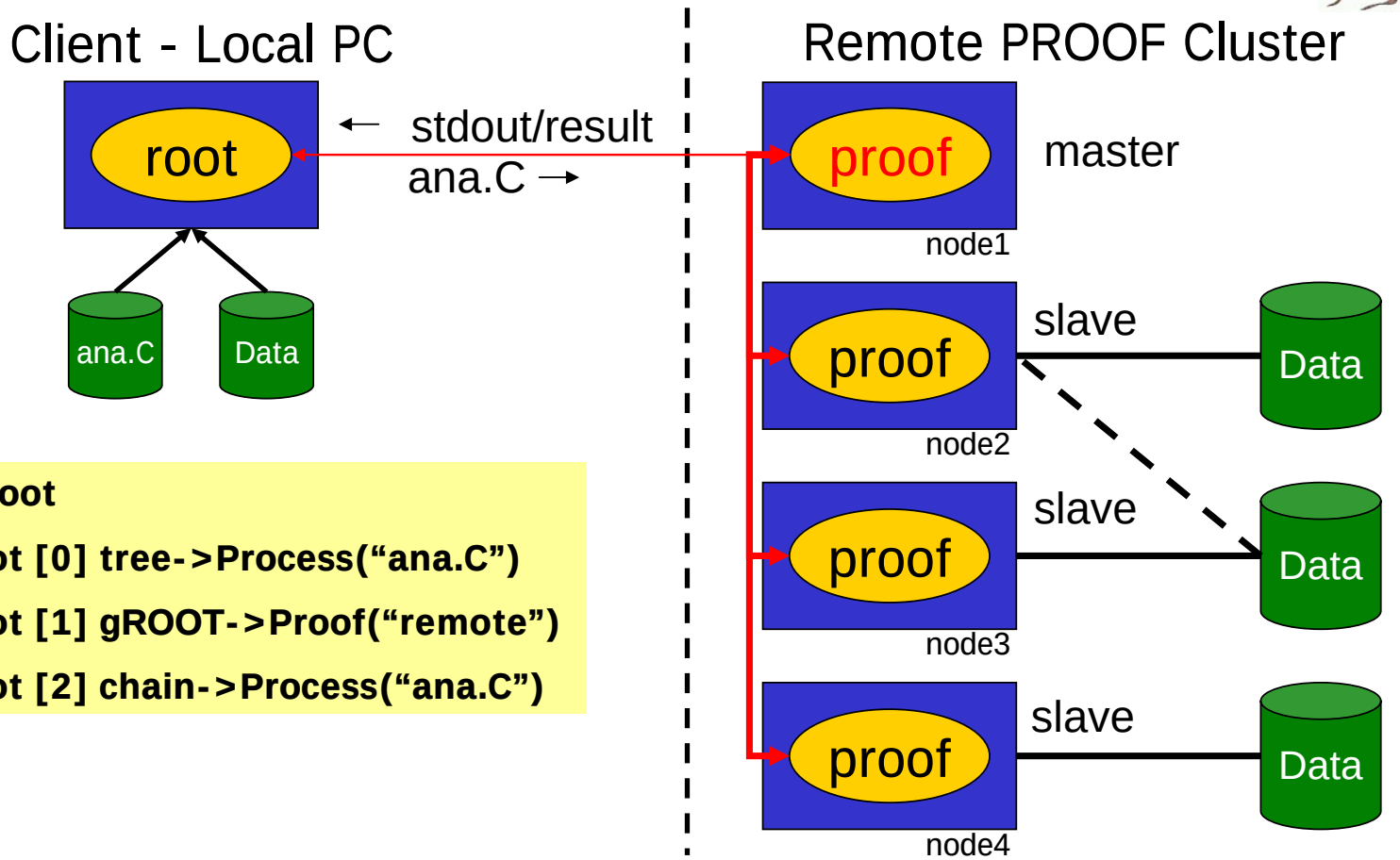
Concept of PROOF

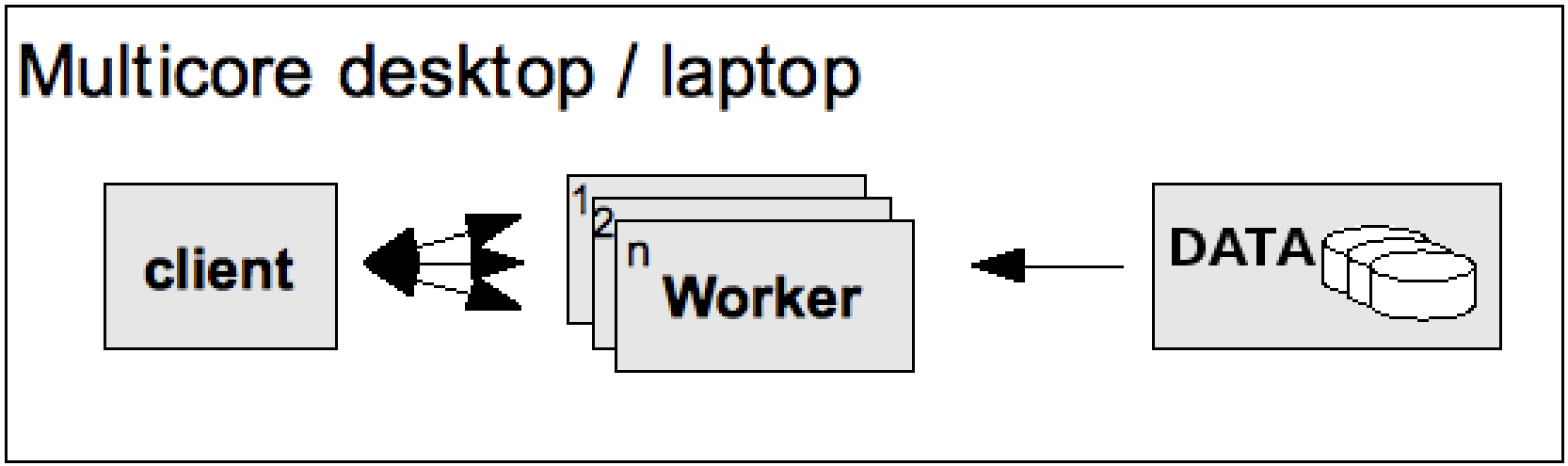
PROOF Schema




```
$ root
root [0] tree->Process("ana.C")
root [1] gROOT->Proof("remote")
root [2] chain->Process("ana.C")
```

Concept of PROOF-lite

Proof-lite is a version of PROOF optimized for local use on multicore desktops and laptops (ROOT version > 5.22).



Documentation:

- `http://root.cern.ch/drupal/content/proof`
- `http://twiki.ihep.ac.cn/twiki/bin/view/PROOF`

Our objectives

- Make it possible to use BEAN on PROOF cluster with minimal changes in the user interface.

Options in BEAN:

run BEAN on PROOF-lite

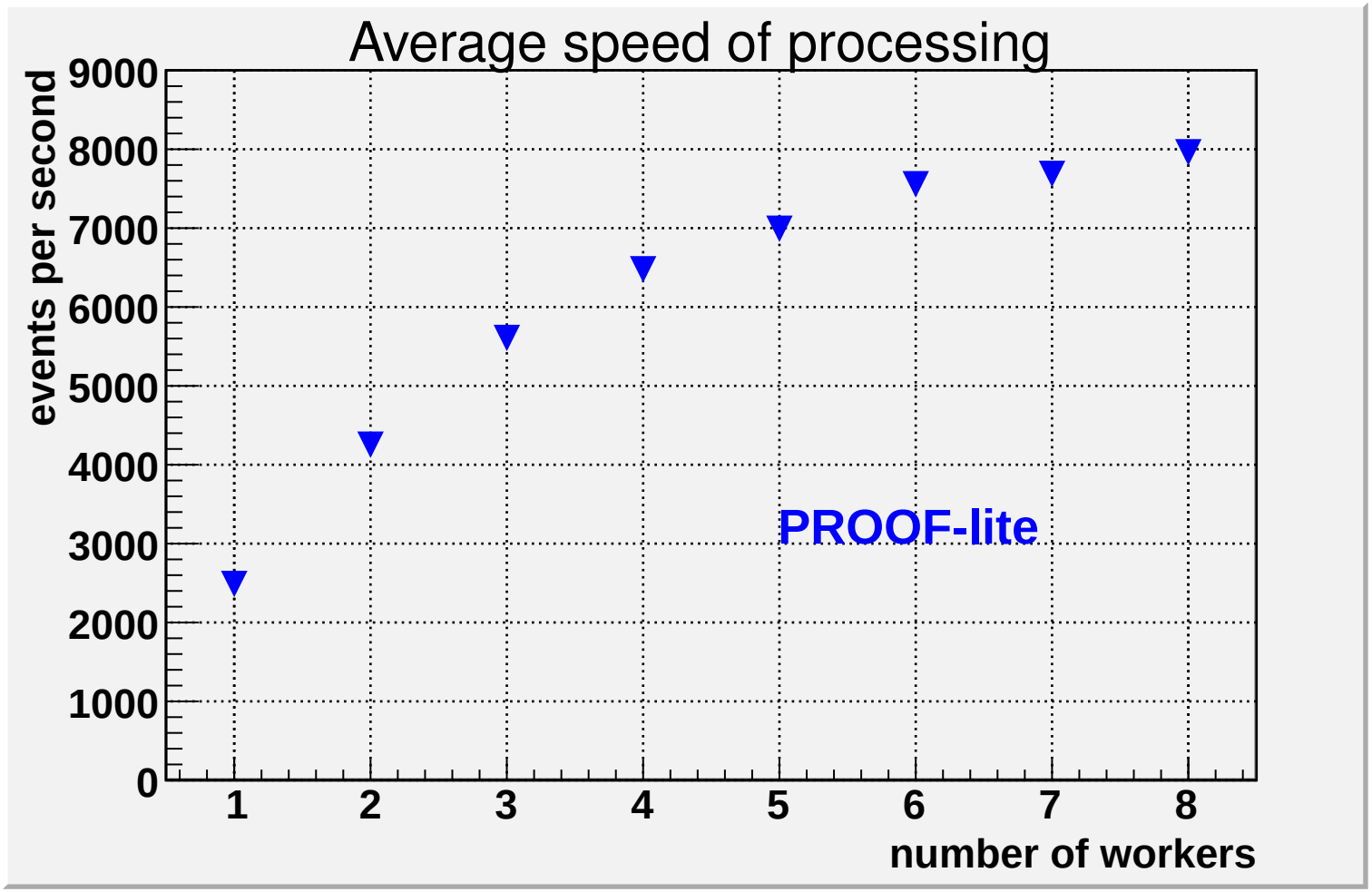
```
> ./bean.exe -l ...
```

run BEAN on PROOF-cluster

```
> ./bean.exe -p "proof@prfserver01.ihep.ac.cn" ...
```

The main developer of the PROOF part of BEAN – Boger Eugeny
<eugenyboger@dgap.mipt.ru>

Test: PROOF-lite



We use 8-core PC(IHEP cluster), user function “Bhabha” and DST files from Lustre file system.

Proof: pro et contra

+ Significantly accelerate calculations
+ Automatic splitting of data and merging the resulting histograms
+ Transparent for users
+ PROOF-lite is stable sufficiently (ROOT 5.26.0)

– PROOF-cluster is not yet stable (ROOT 5.26.0)
– It is very difficult to debug program
– It can merge only ROOT objects (histograms/trees); large output trees create problems
– It requires installation of the same version of ROOT everywhere

Credits

- We thank Zhang Xiaomei for initiating and support of our PROOF studies.
- We thank IHEP computer center for providing us with PROOF cluster to test our program.

谢谢