

I		2
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III		3
1	3
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1

EBT2/EBT3 (<http://www.gafchromic.com/gafchromic-film/radiotherapy-films/EBT/index.asp>)

,
.tff

..
ROOT (<http://root.cern.ch>),

ROOT

. ROOT

ROOT.

ROOT.

2

Epson700

720 dpi.

(Portrait),

(Landscape)

(Portrait)

48-bit TIFF

tiff.

Image - 48-bit RGB (

3

3.1

```

: WindowsXP x86;

: 2 ;

: 1 ;

: 1,5 ;

: ;

: ;

: ;

: 1920x1080;

```

3.2

EBTfilm.zip

- **root_v5.34.32.win32.vc10.exe** - ROOT (<http://root.cern.ch>)
- **AnalyzeMacros** - ROOT
- **CalibratonMacros** - ROOT
- **Setup.bat** -
- **Uninstall.bat** -
- **Tif2RootReg.bat** -
 .tiff
- **RemoveTif.reg** - .tiff
- **vsvars10.sh, .bash_profile** -

3.3

Setup.bat
Uninstall.bat

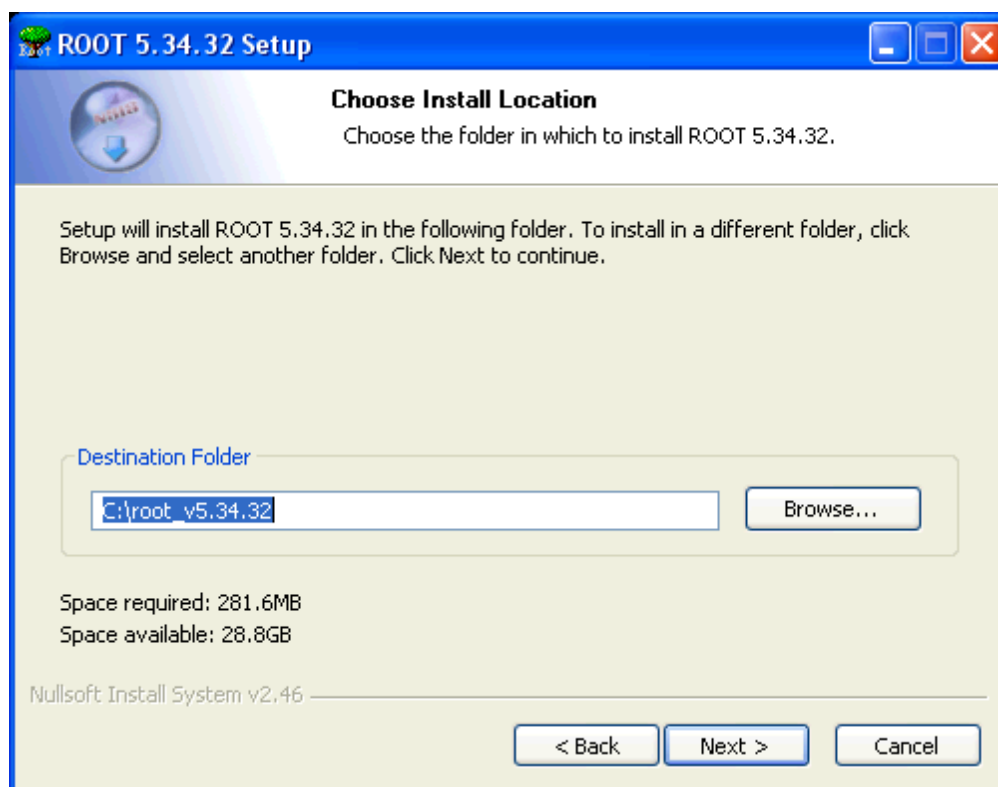
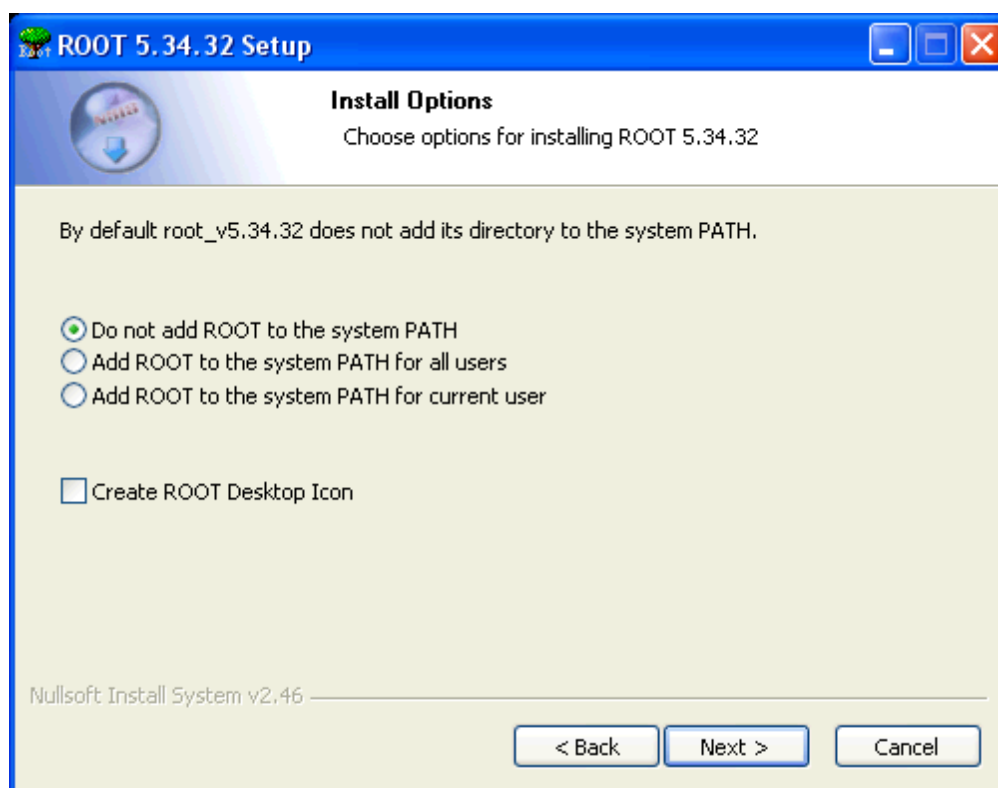
3.3.1

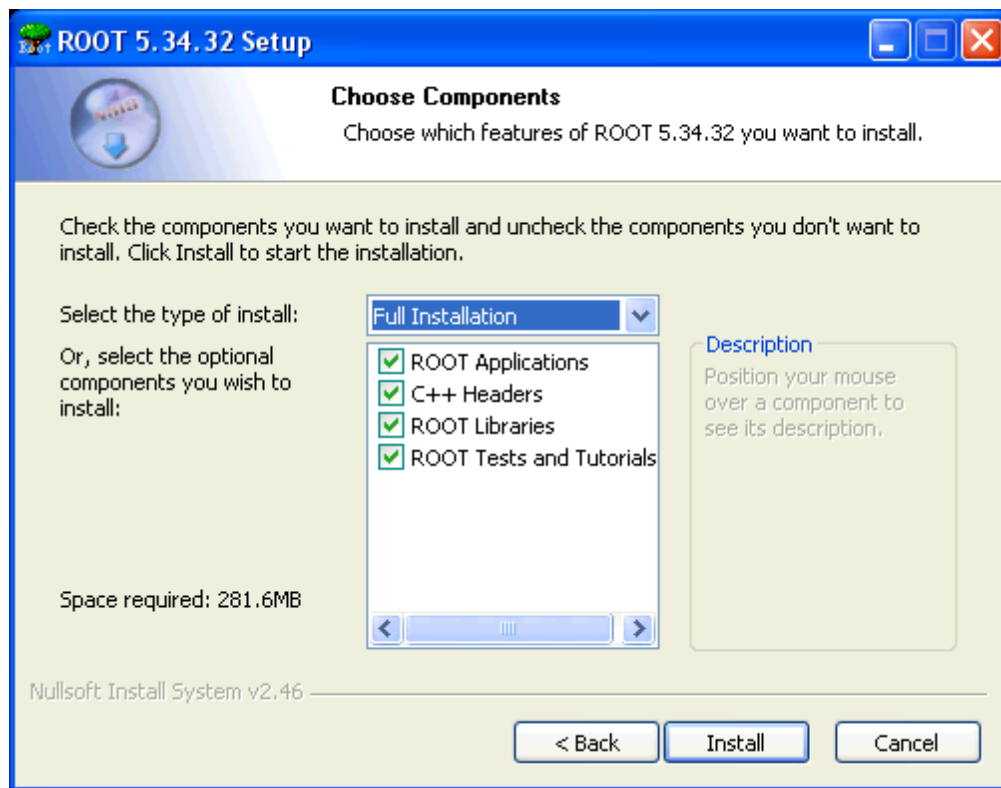
ROOT

ROOT

ROOT







3.3.2

TIFF

.tiff

(
.tiff)

(

,

-

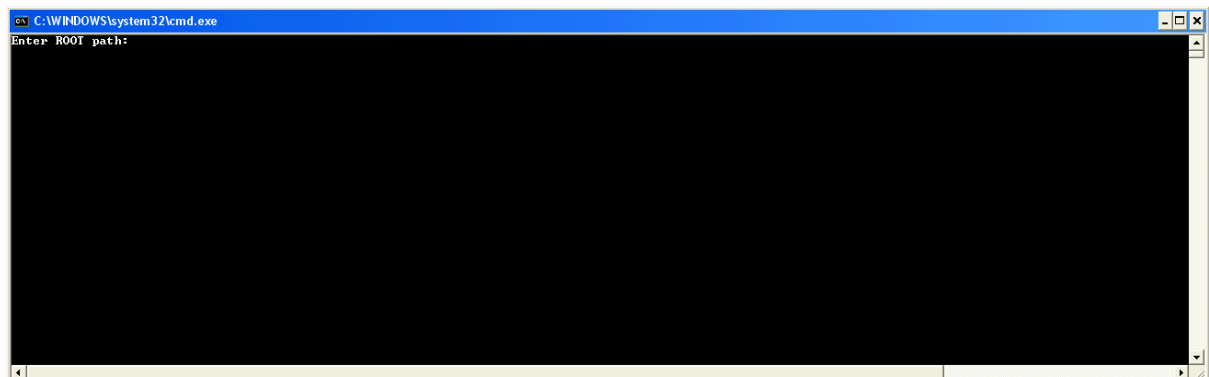
),

.

Tif2RootReg.bat

%ROOTSYS%

\macros



Enter (ROOT path
ROOT)
ROOT.
RemoveTif.reg
%ROOTSYS%\macros

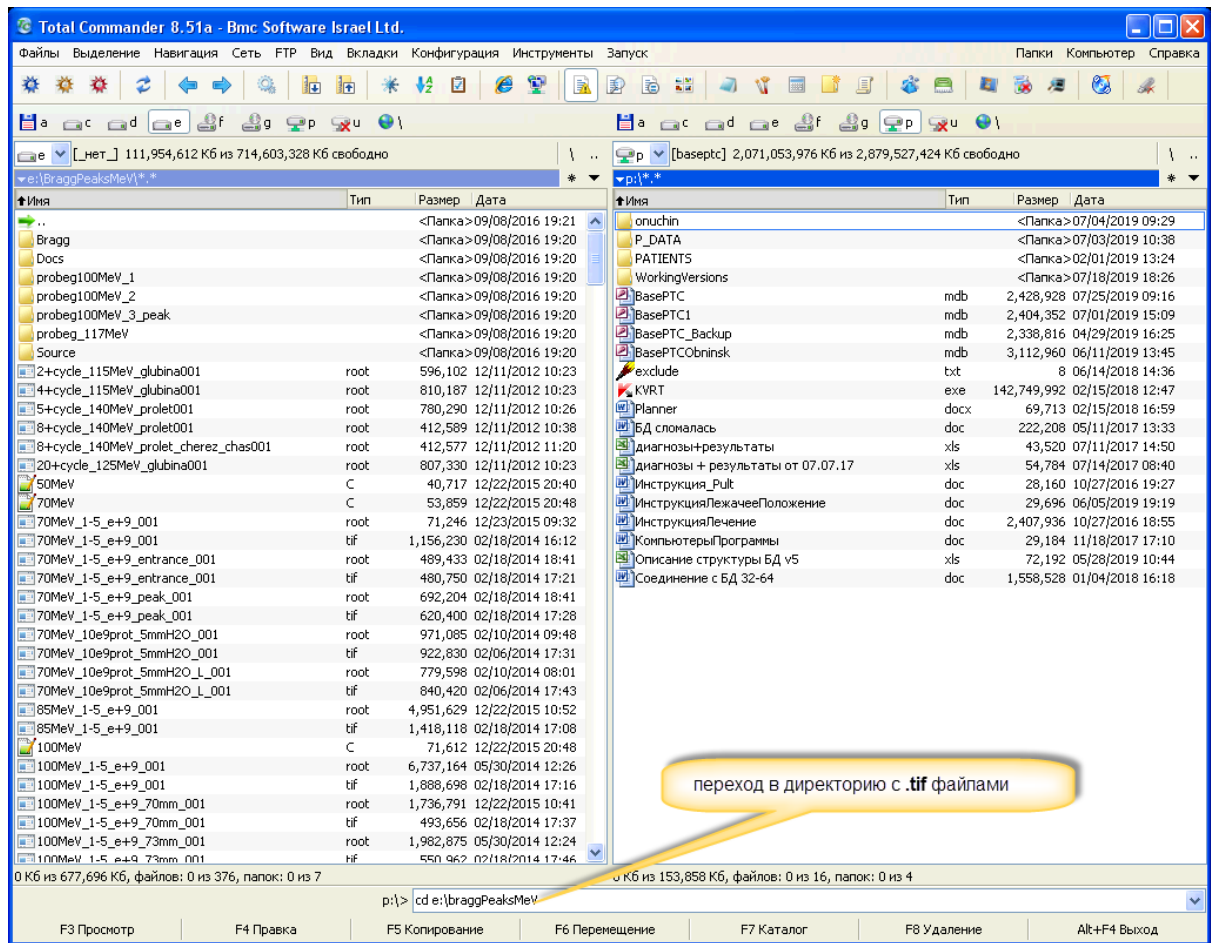
3.4

1. ROOT ; :
2. ;
3. .tiff

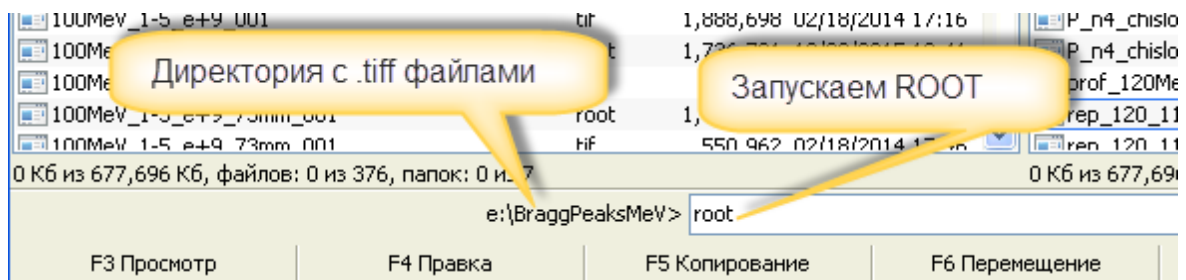
3.4.1

ROOT

Total Commander .tiff



ROOT

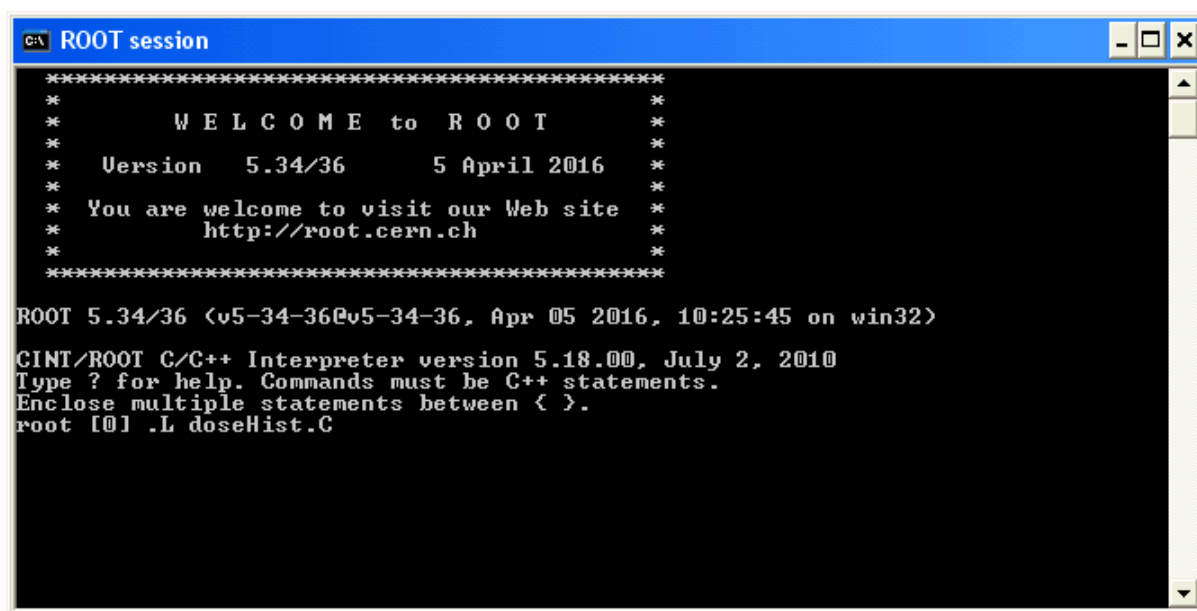


doseHist.C

doseHistA.C

%ROOTSYS%\macros

" "

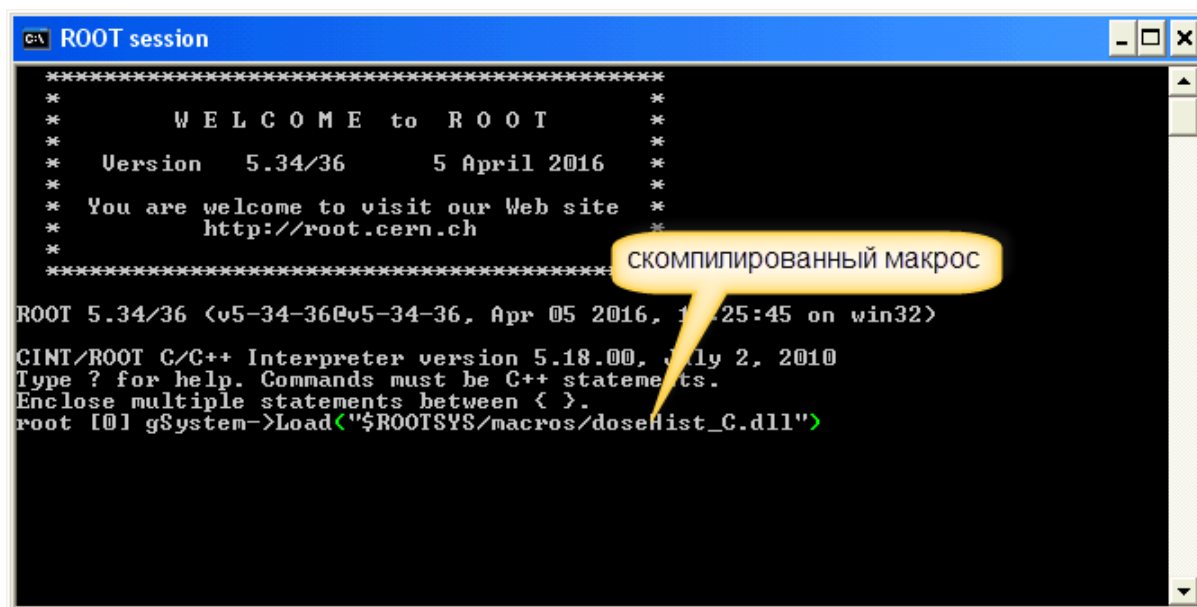


```
C:\ ROOT session

*****
*           W E L C O M E to R O O T           *
*           Version  5.34/36      5 April 2016    *
*   You are welcome to visit our Web site      *
*           http://root.cern.ch                 *
*****

ROOT 5.34/36 (v5-34-36@v5-34-36, Apr 05 2016, 10:25:45 on win32)

CINT/ROOT C/C++ Interpreter version 5.18.00, July 2, 2010
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
root [0] .L doseHist.C
```



```
C:\ ROOT session

*****
*           W E L C O M E to R O O T           *
*           Version  5.34/36      5 April 2016    *
*   You are welcome to visit our Web site      *
*           http://root.cern.ch                 *
*****

ROOT 5.34/36 (v5-34-36@v5-34-36, Apr 05 2016, 10:25:45 on win32)

CINT/ROOT C/C++ Interpreter version 5.18.00, July 2, 2010
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
root [0] gSystem->Load("$ROOTSYS/macros/doseHist_C.dll")
```

скомпилированный макрос

doseHist .tif

```

C:\ ROOT session
*****
*           W E L C O M E  t o  R O O T           *
*           *                                     *
*   Version   5.34/36       5 April 2016          *
*           *                                     *
* You are welcome to visit our Web site          *
*           http://root.cern.ch                  *
*           *                                     *
*****

ROOT 5.34/36 (v5-34-36@v5-34-36, Apr 05 2016, 10:25:45 on win32)
CINT/ROOT C/C++ Interpreter version 5.18.00, July 2, 2010
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
root [0] .L doseHist.C
root [1] doseHist<'100MeV_1-5_e+9_001.tif'>

```

doseHistA.C

```

//
void doseHistA(const char *file, const char *calibr = "PortraitRed.h")
{
    // Loads precompiled doseHist.C macro and execute it

    TString dll = gSystem->ExpandPathName("${ROOTSYS}\\macros\\doseHist_C.dll");
    gSystem->Load(dll.Data());
    doseHist(file, calibr);
}

```

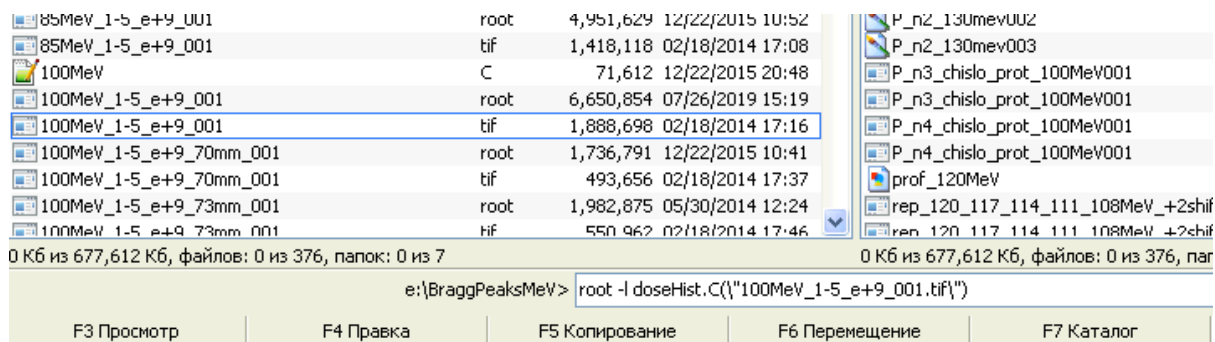
3.4.2

Total Commander

```

C:\WINDOWS\system32\cmd.exe
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>
E:\BraggPeaksMeU>root -l doseHistA.C<'100MeV_1-5_e+9_001.tif'>

```



doseHistA.C,

doseHist.C

3.4.3

.tiff

(
.tiff).

- ()

Ti-

f2RootReg.bat

%ROOTSYS%\macros

RemoveTif.reg

%ROOTSYS%\macros.

4

ROOT

doseHist.C,

doseHist_C.dll.

%ROOTSYS%\macros

doseHist.C

ROOT C++

, " (")

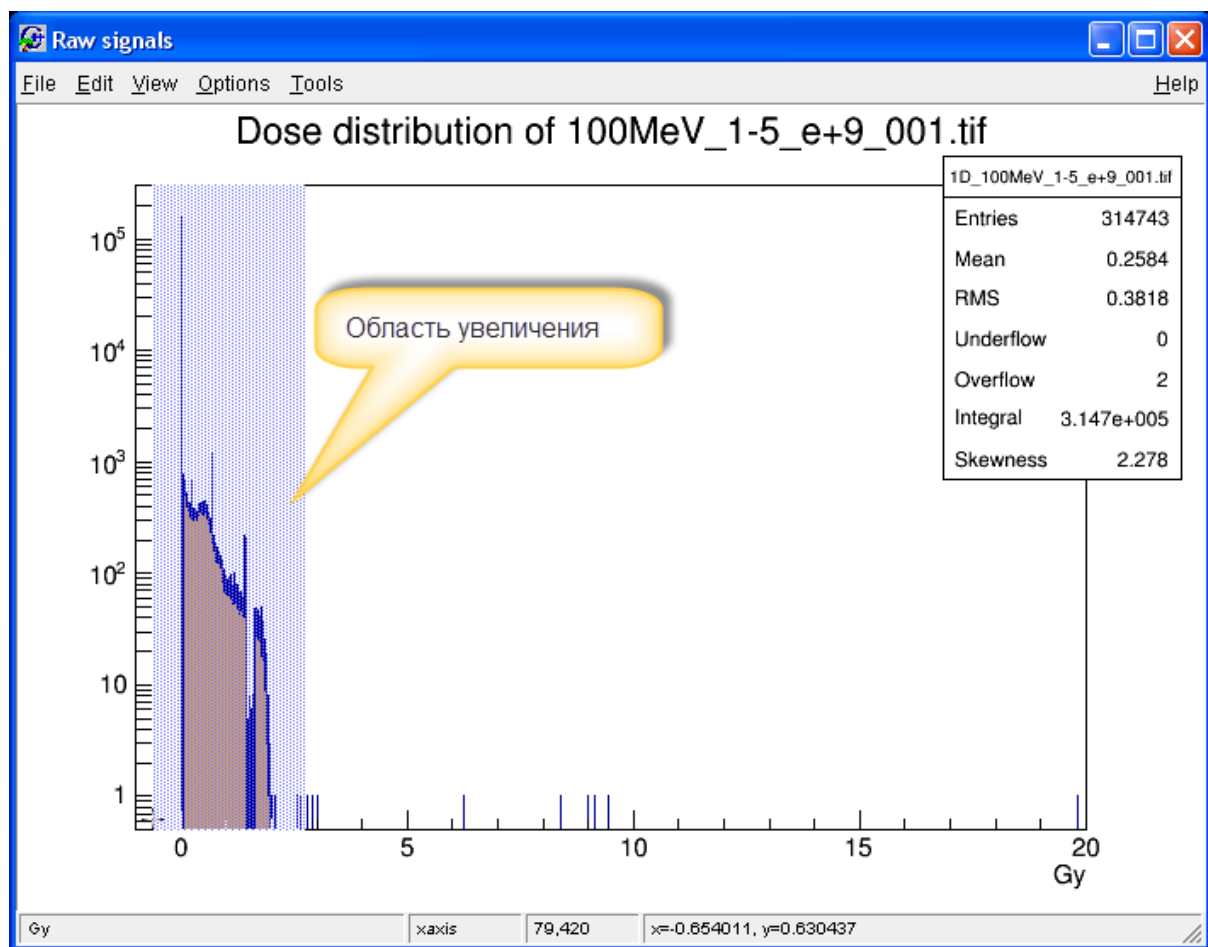
doseHist_C.dll

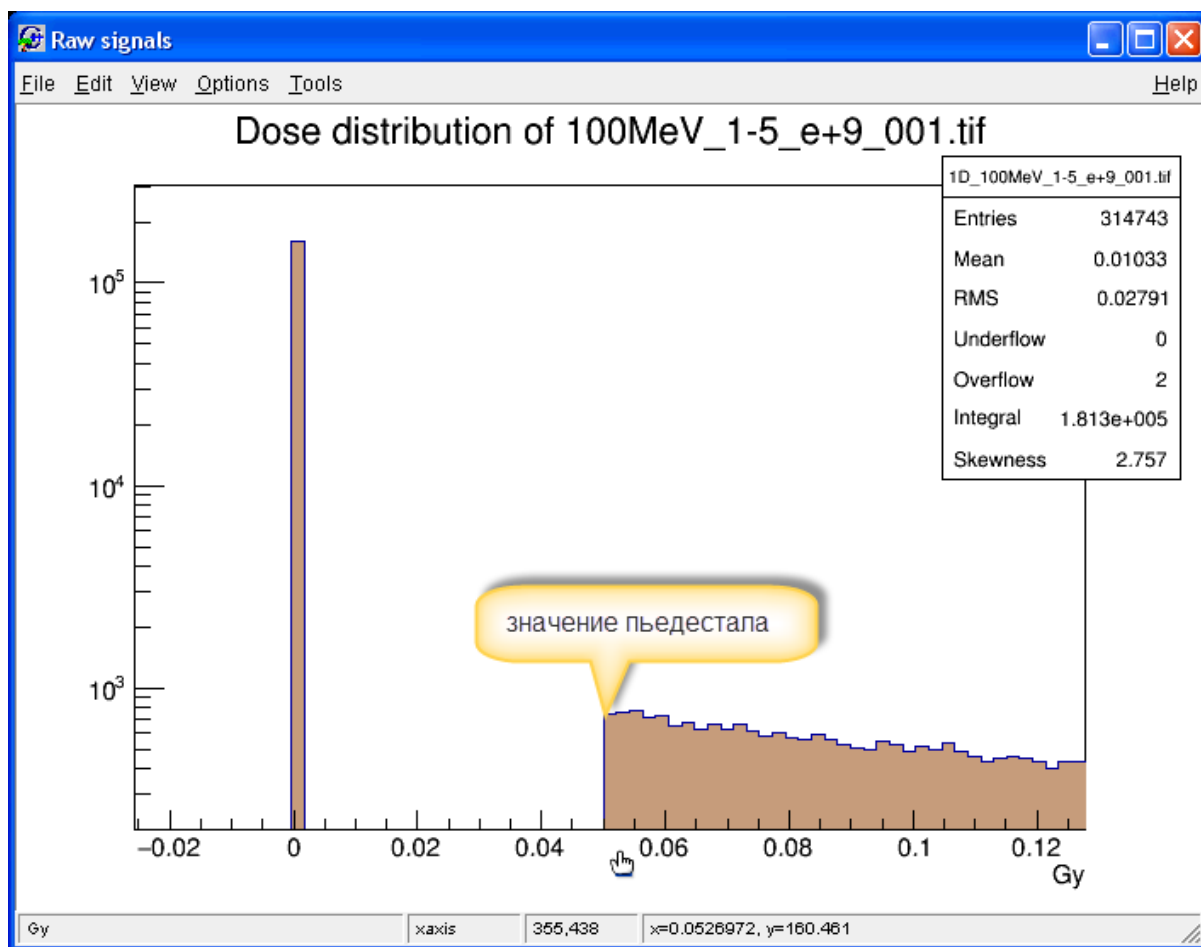
ROOT

ROOT

4.1

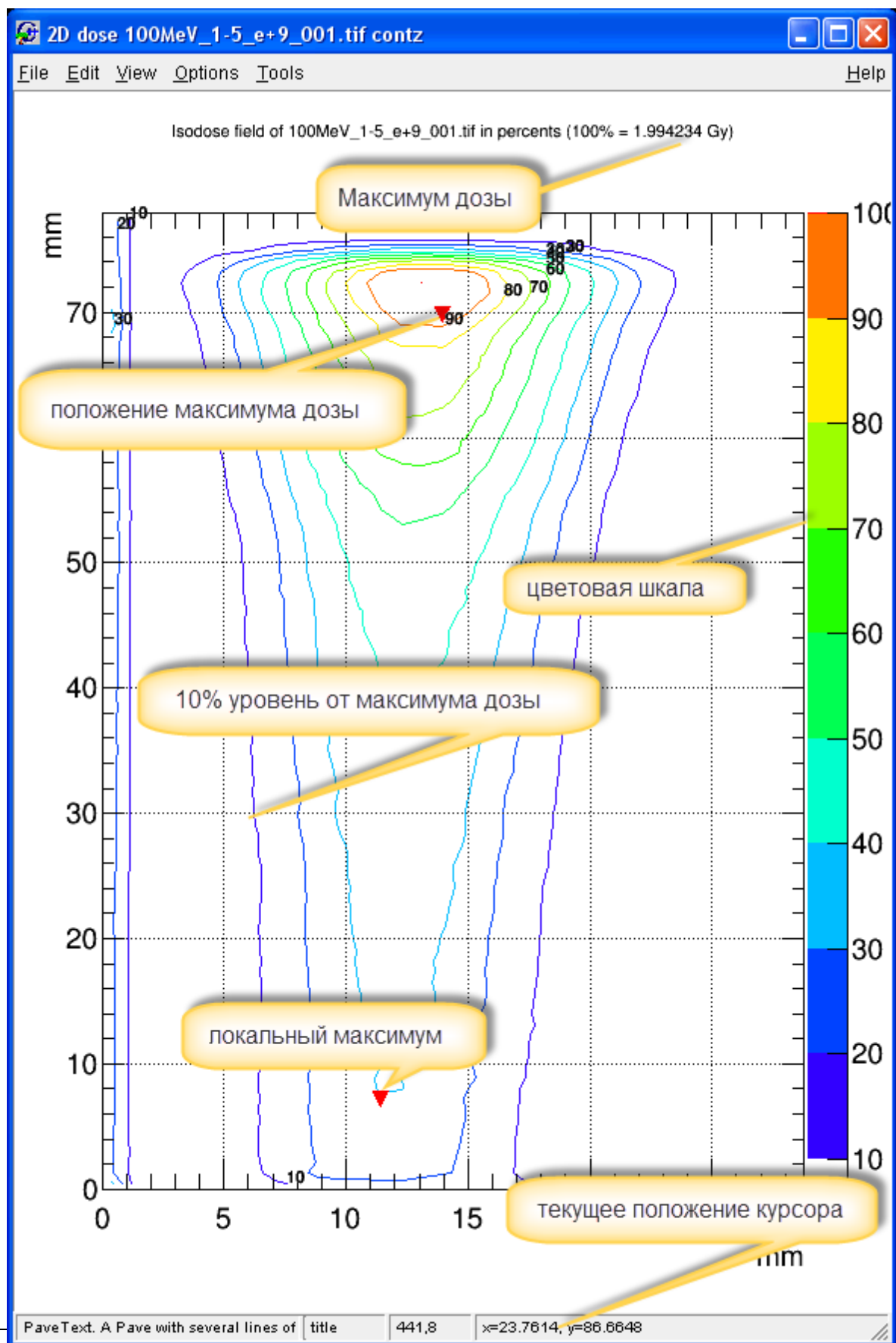
X Y,





4.2

0 - 90% (10%)

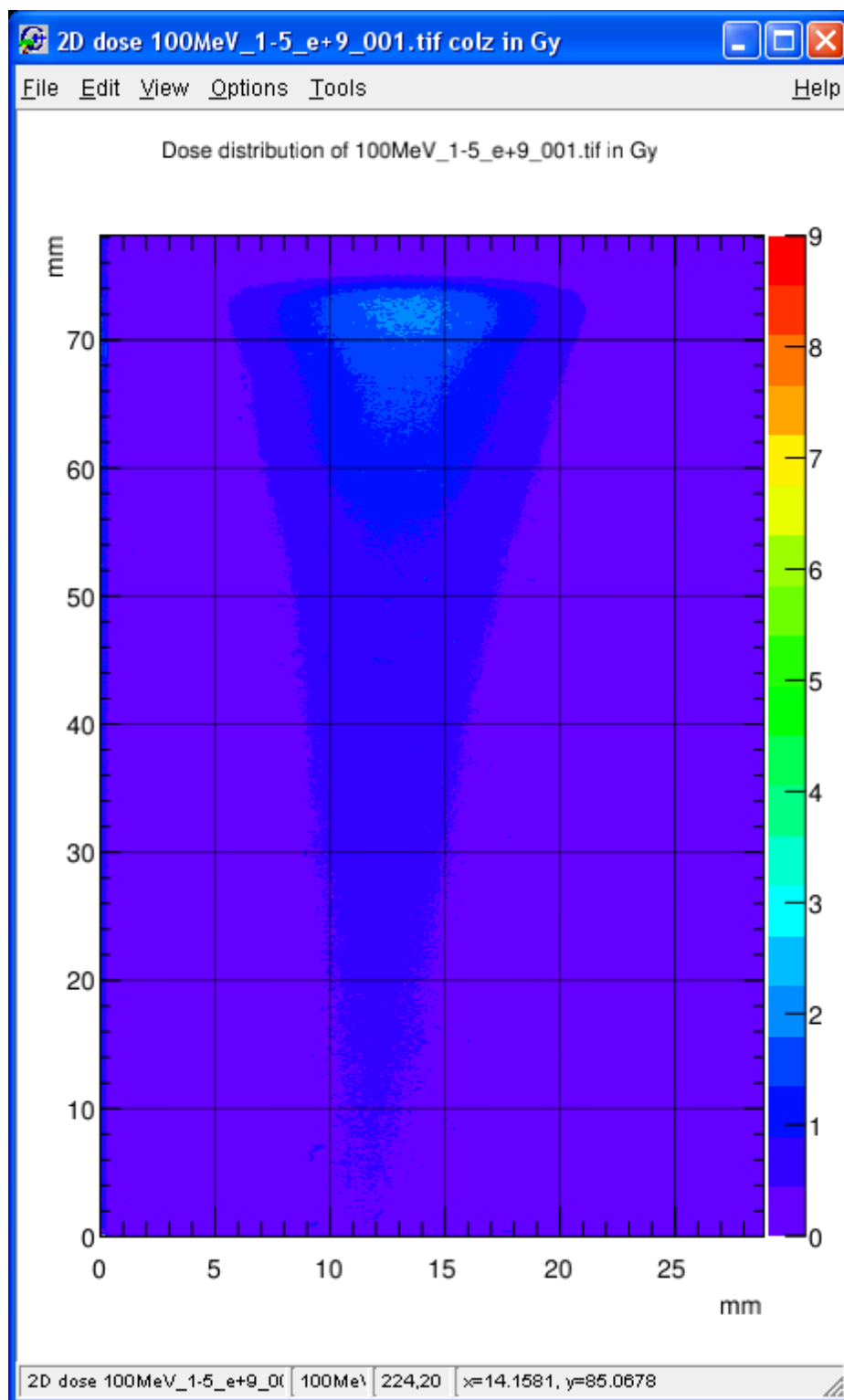


4.3

.

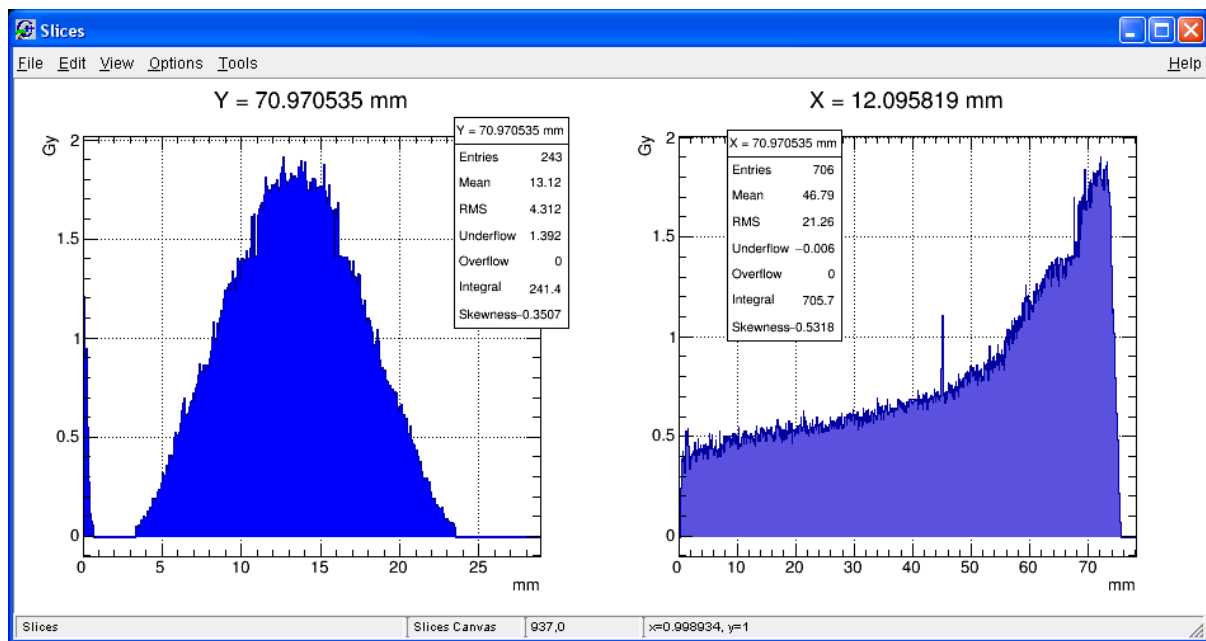
X,Y

.

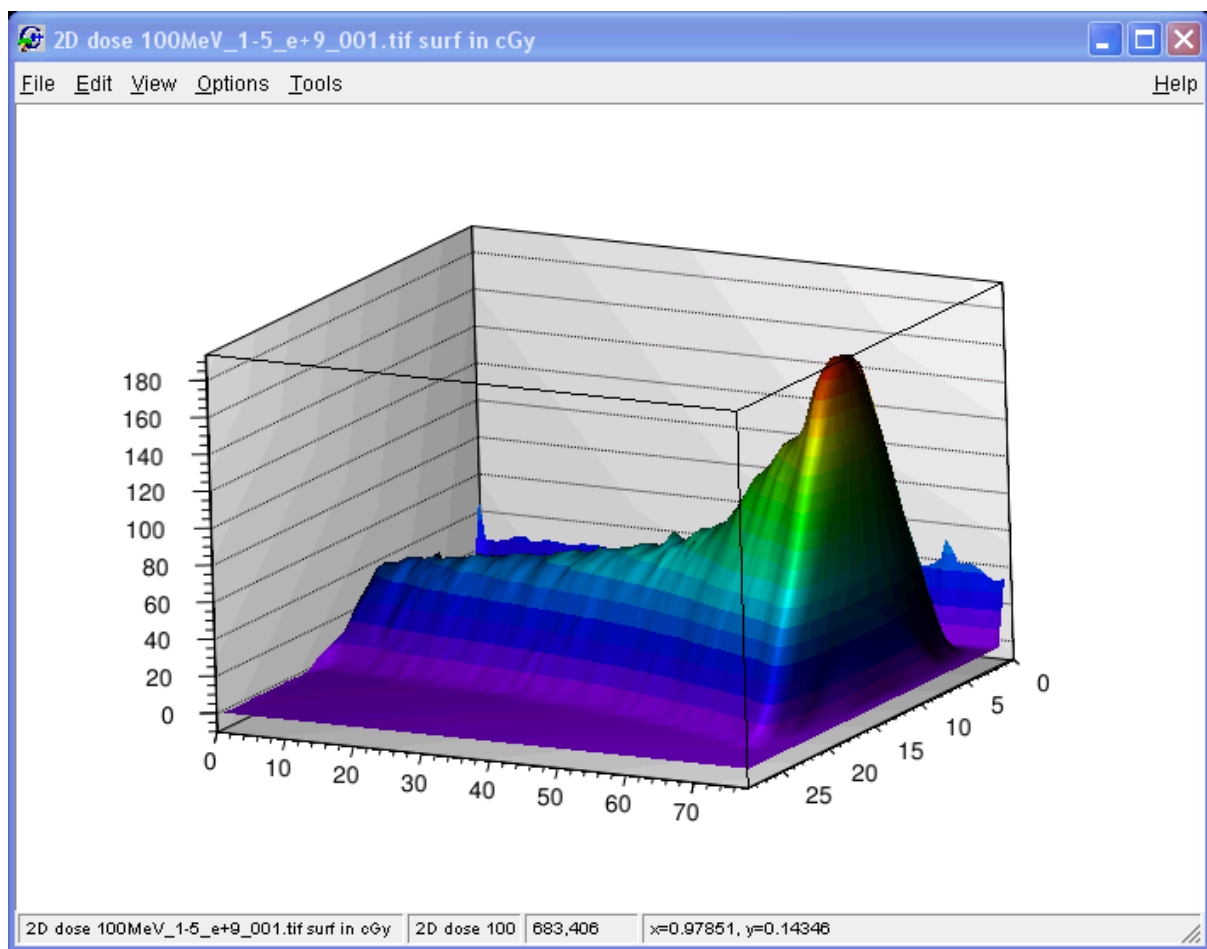


X,Y

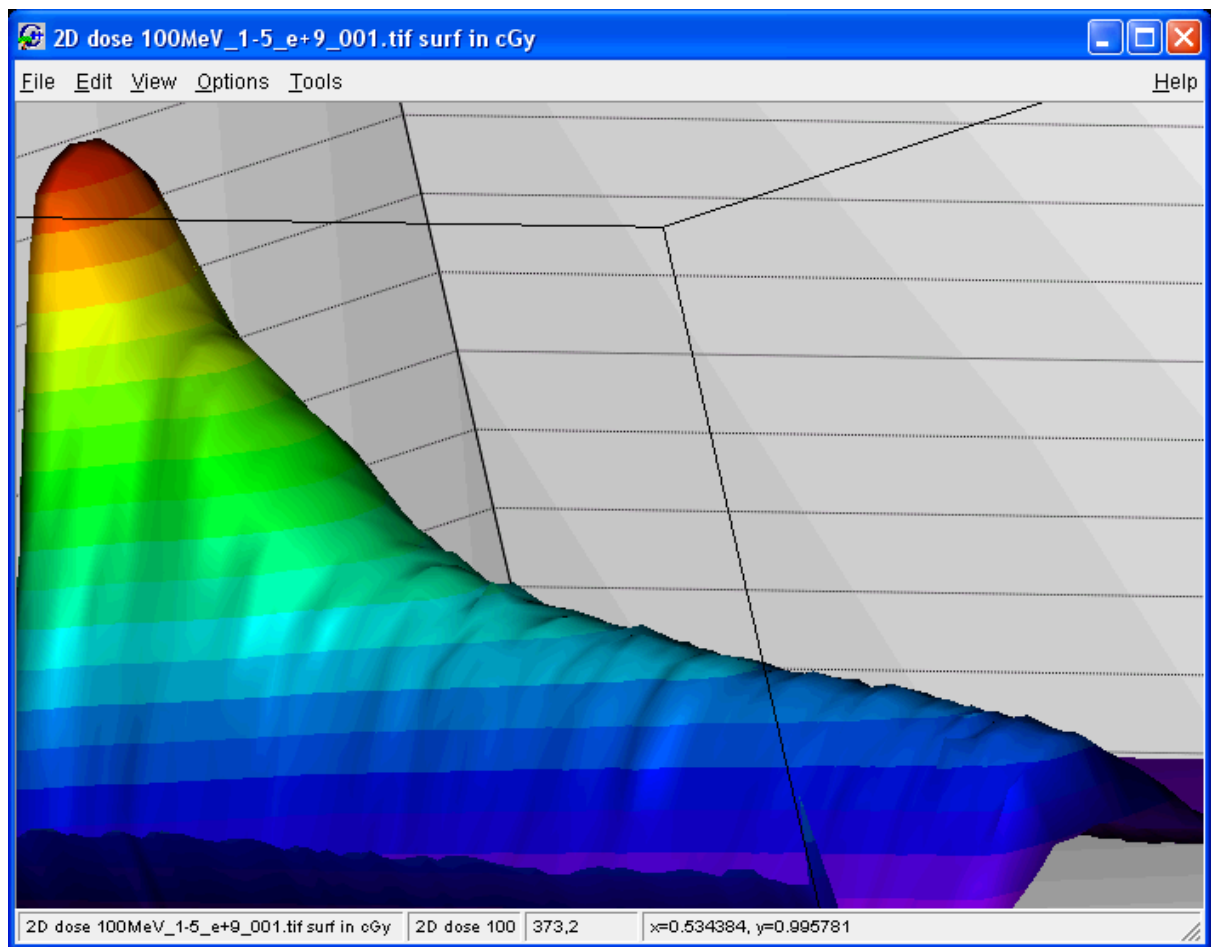
X,Y



4.4 3D



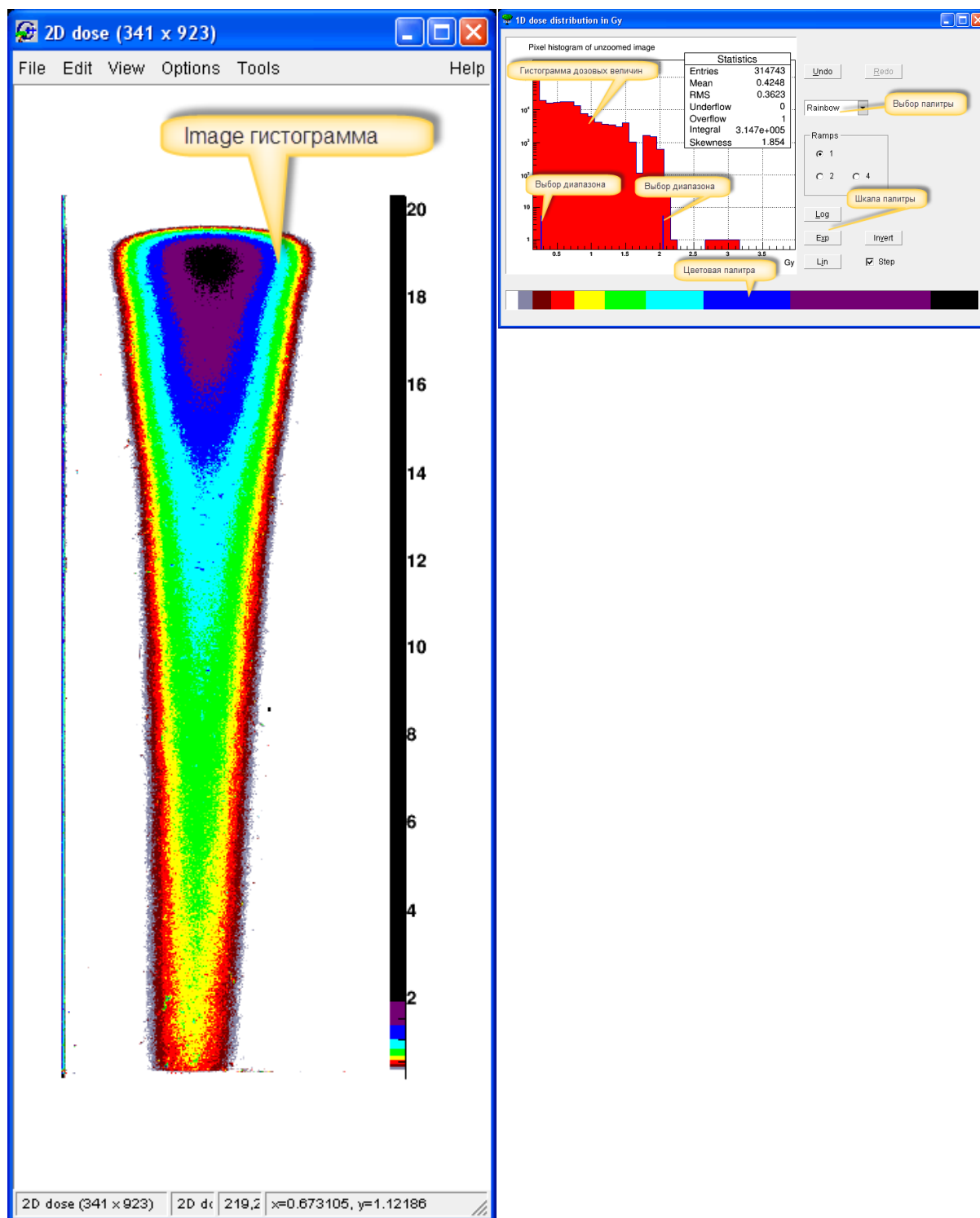
/ .

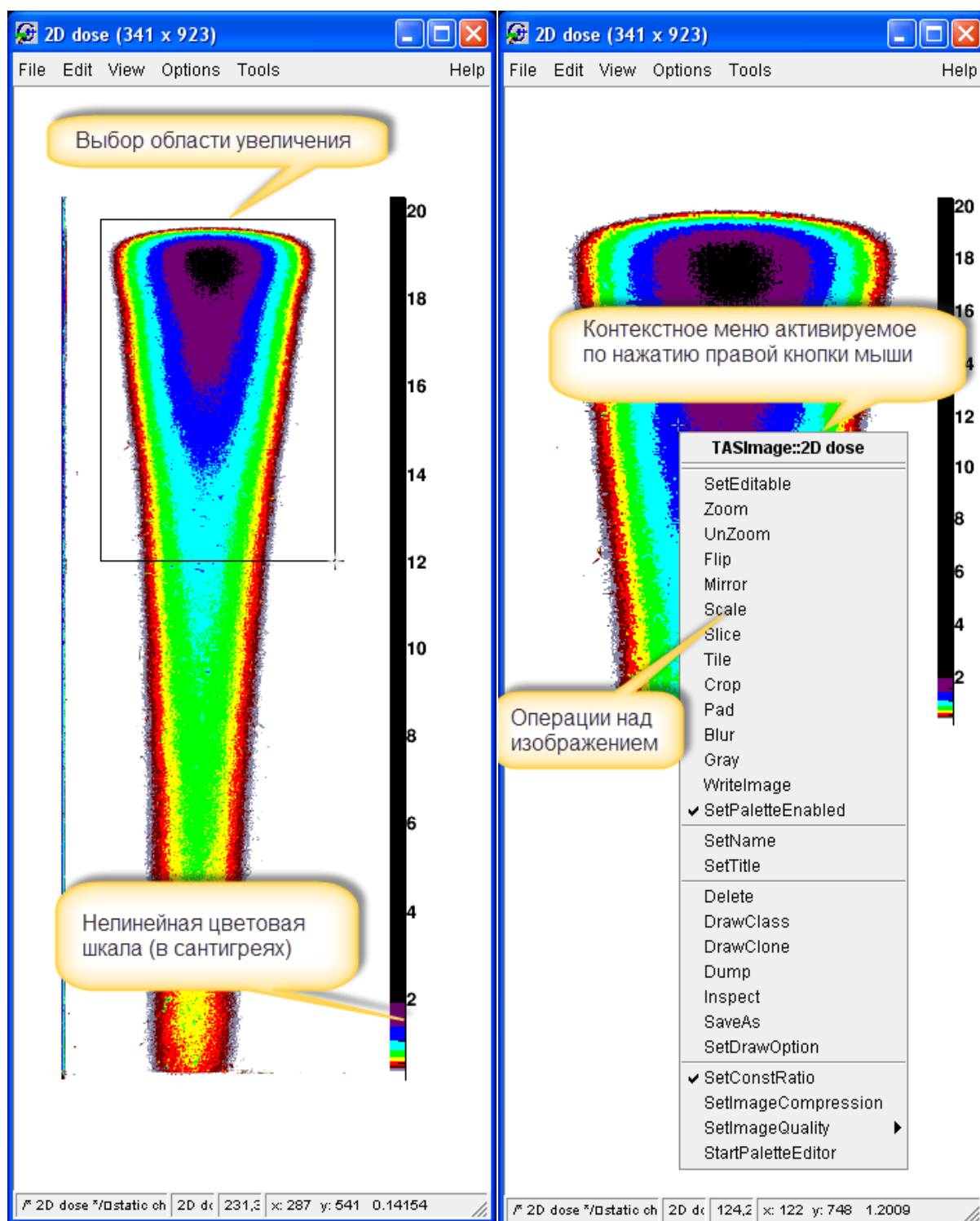


4.5 Image

2D

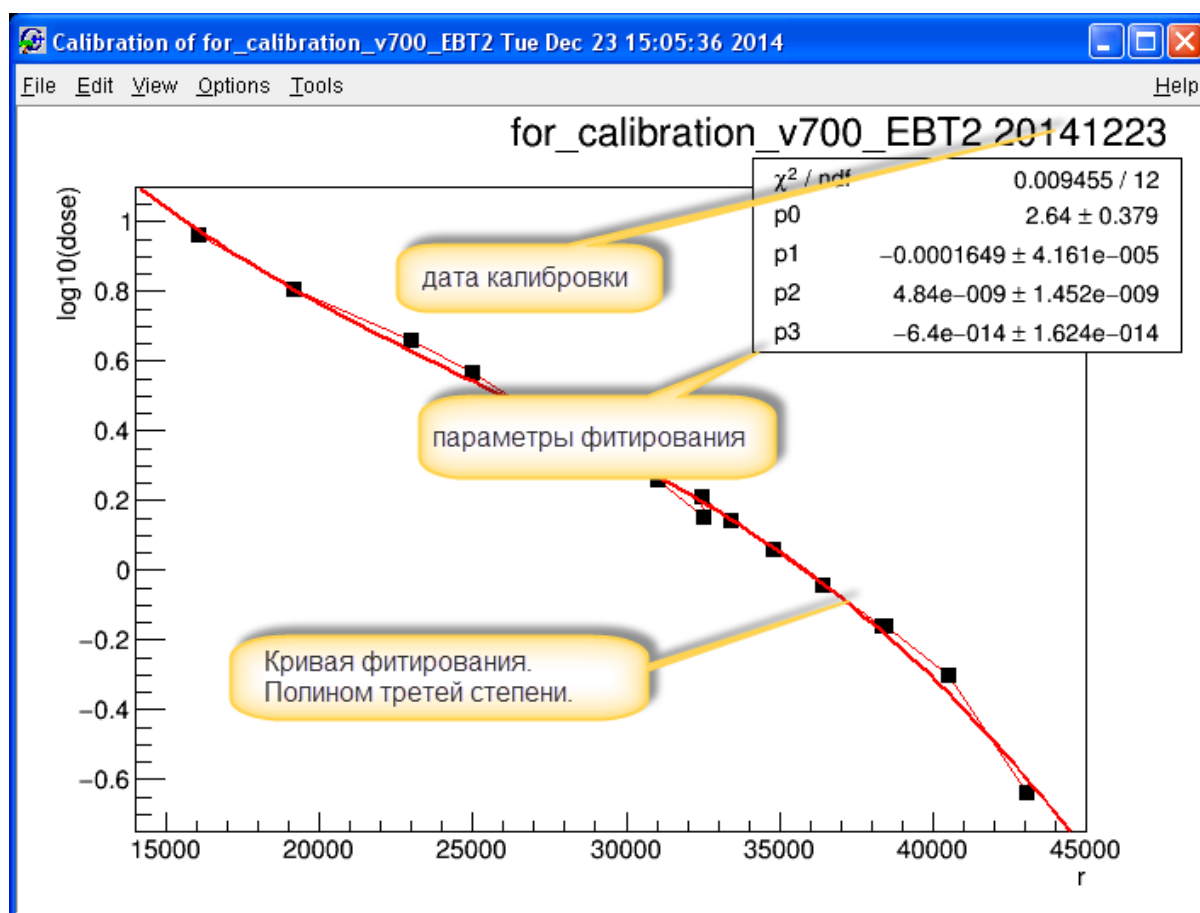
15,





ROOT

4.6

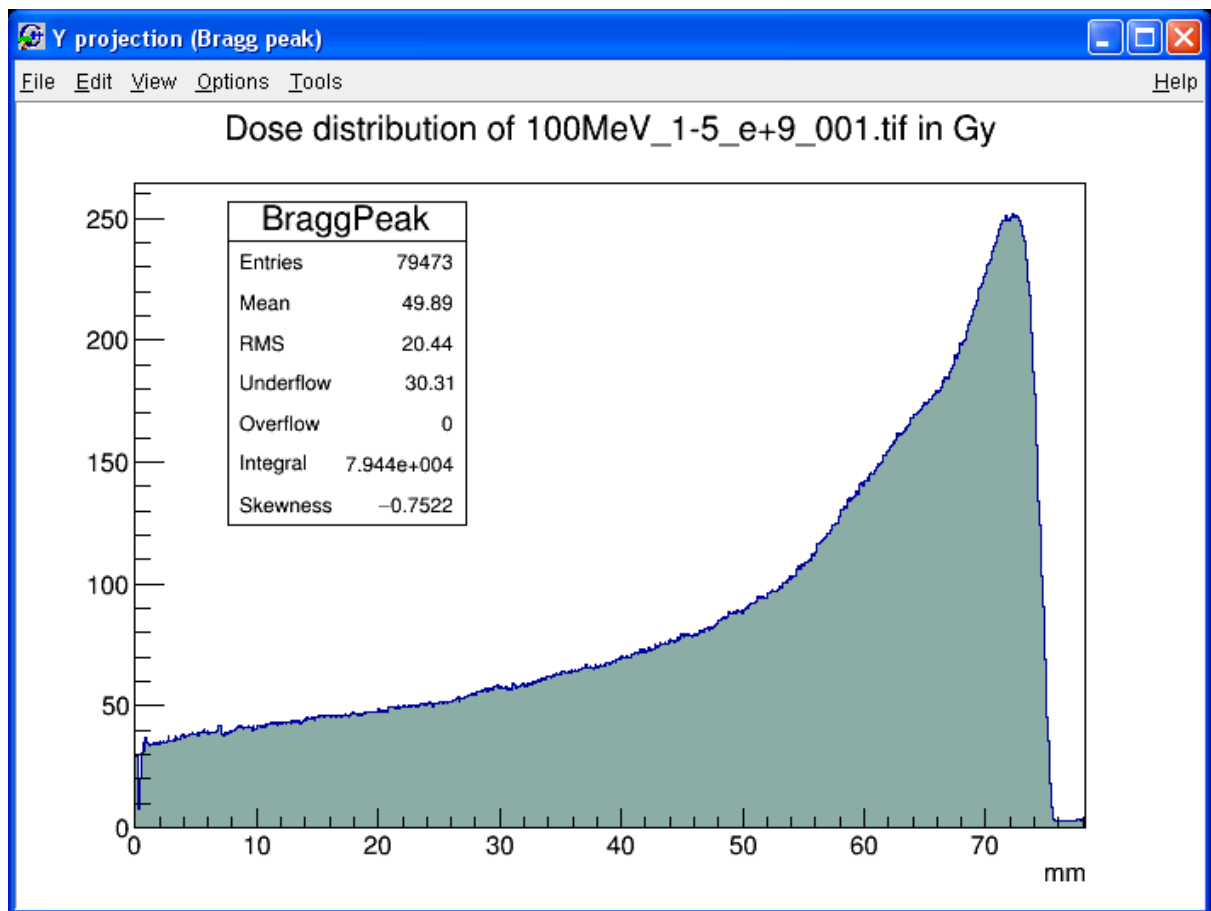


4.7 Y

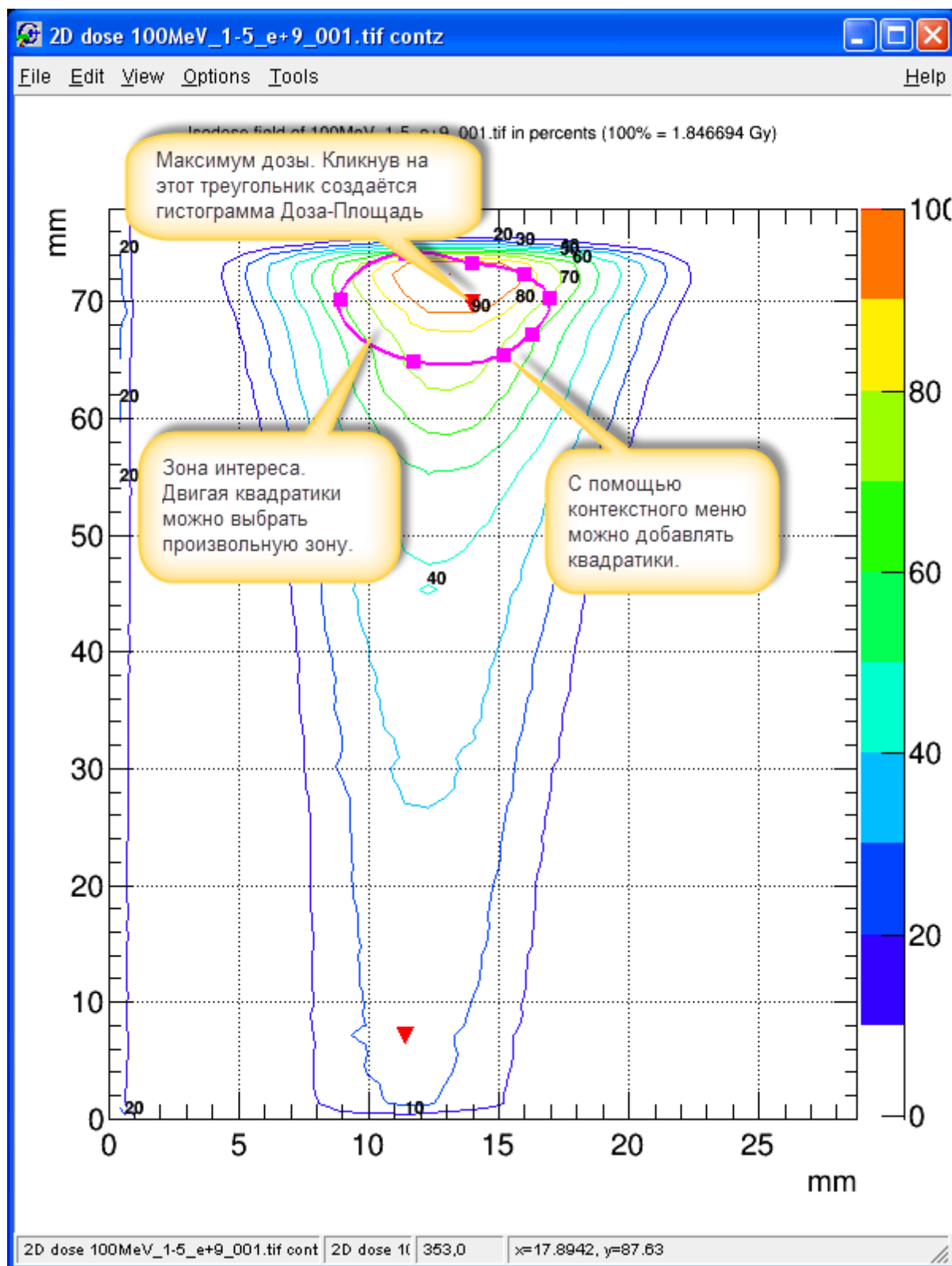
X, " "

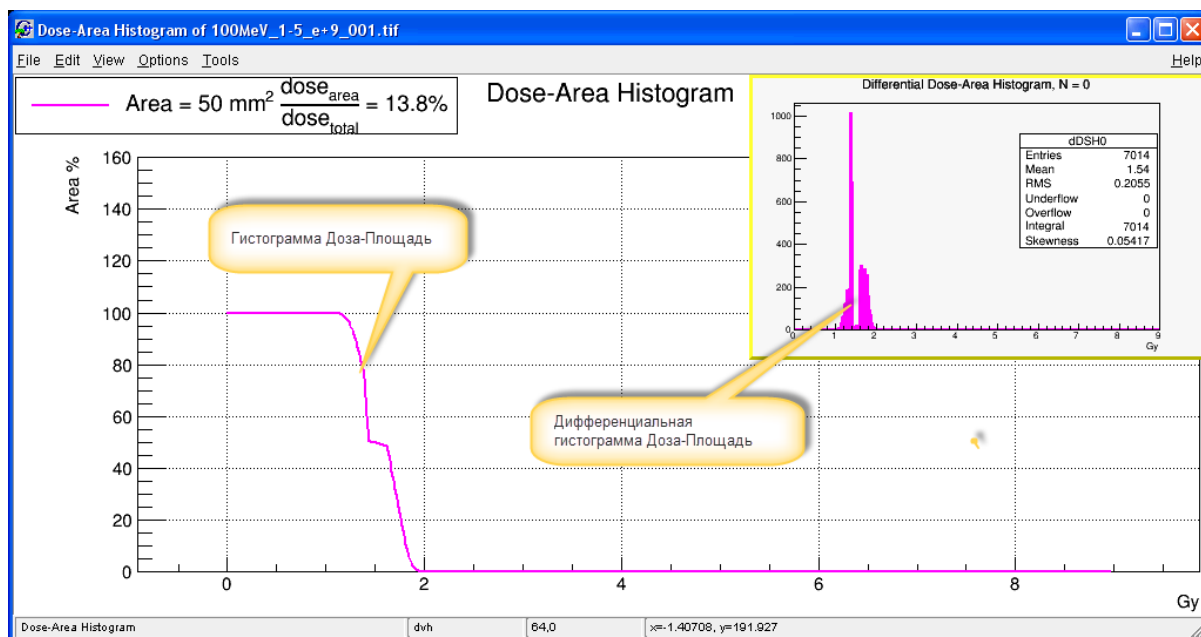
"

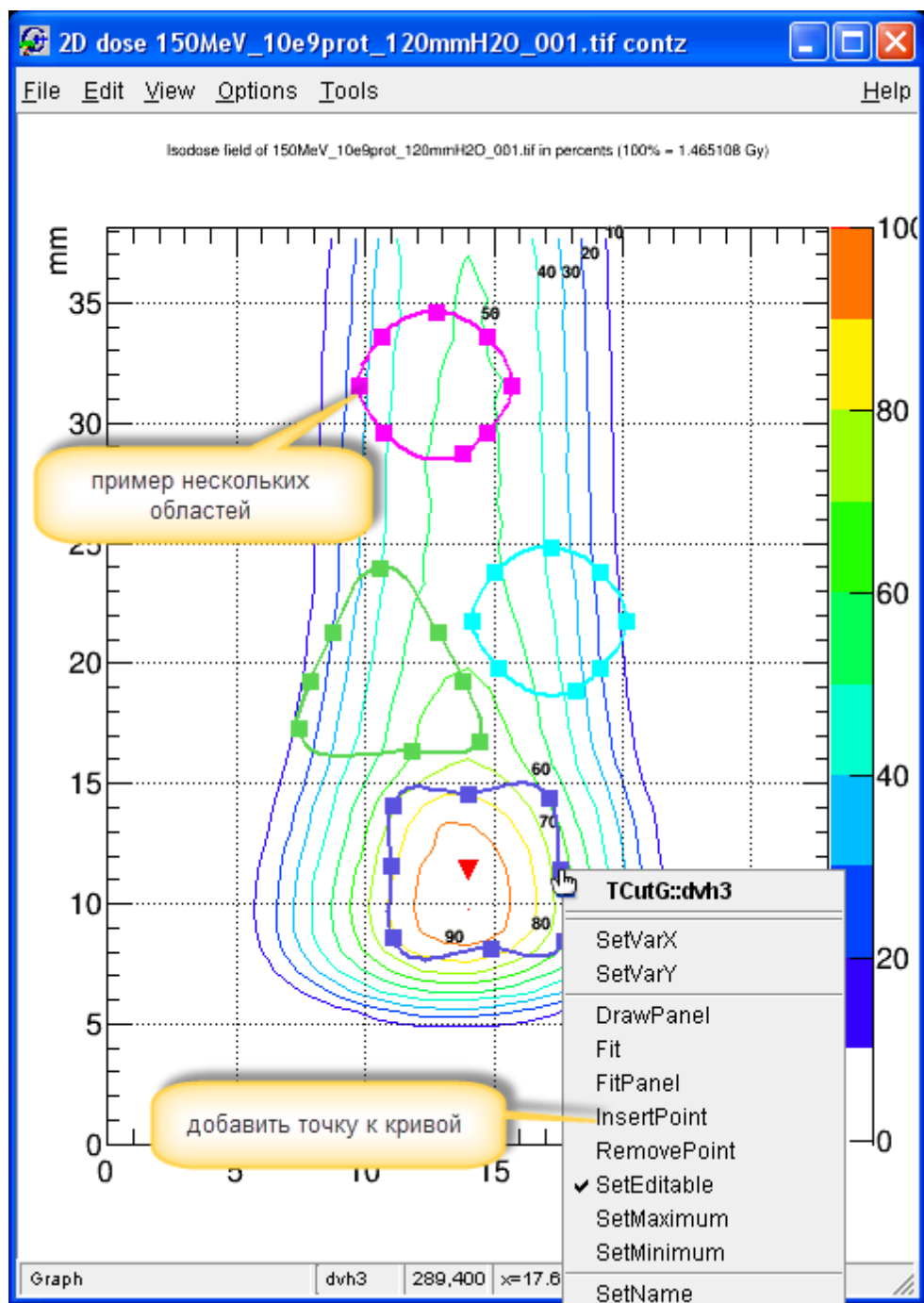
"

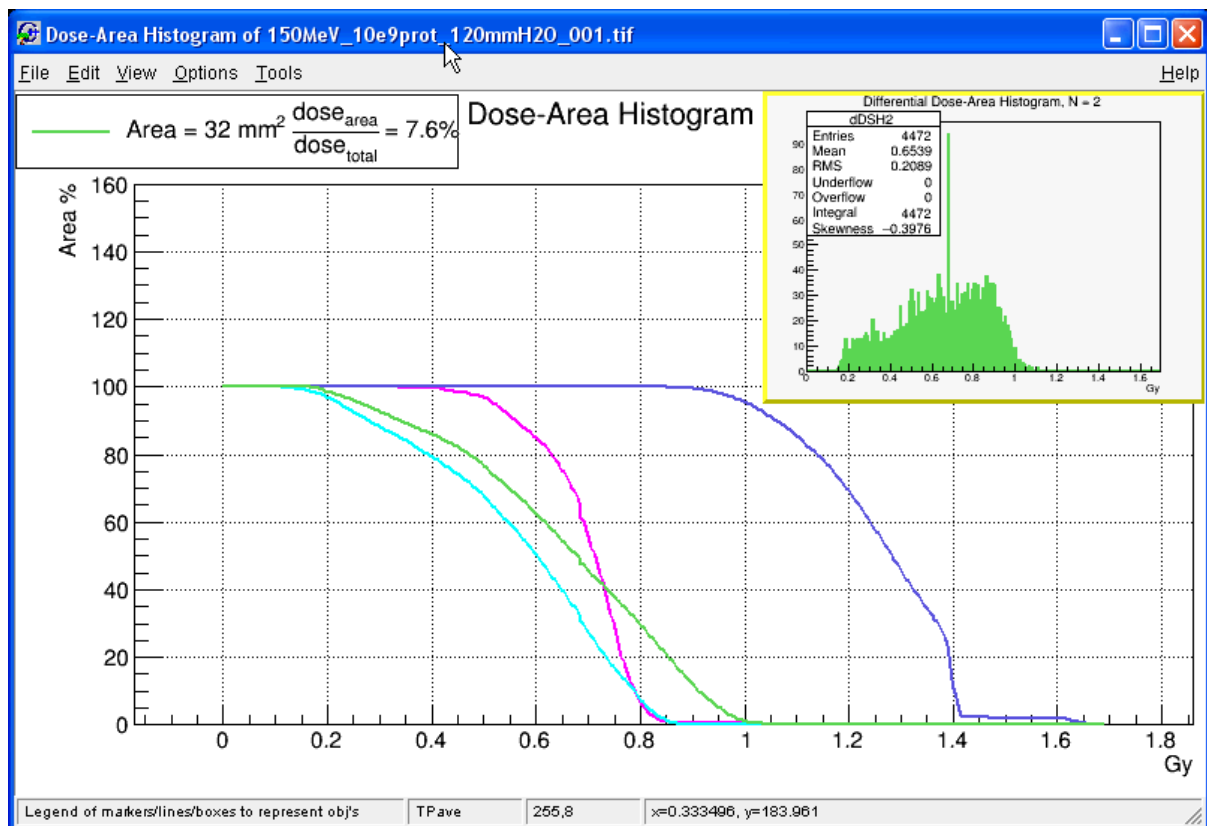


4.8









4.9

" " " " , dE/dx

$$Intensity = Constant \cdot \frac{\int Dose}{Dpi \cdot Dpi \cdot \frac{dE}{dx}(Energy)} \cdot filmDensity$$

Dpi - ()
dE/dx(Energy) -

doseHist.C,

double Intensity(int Energy)

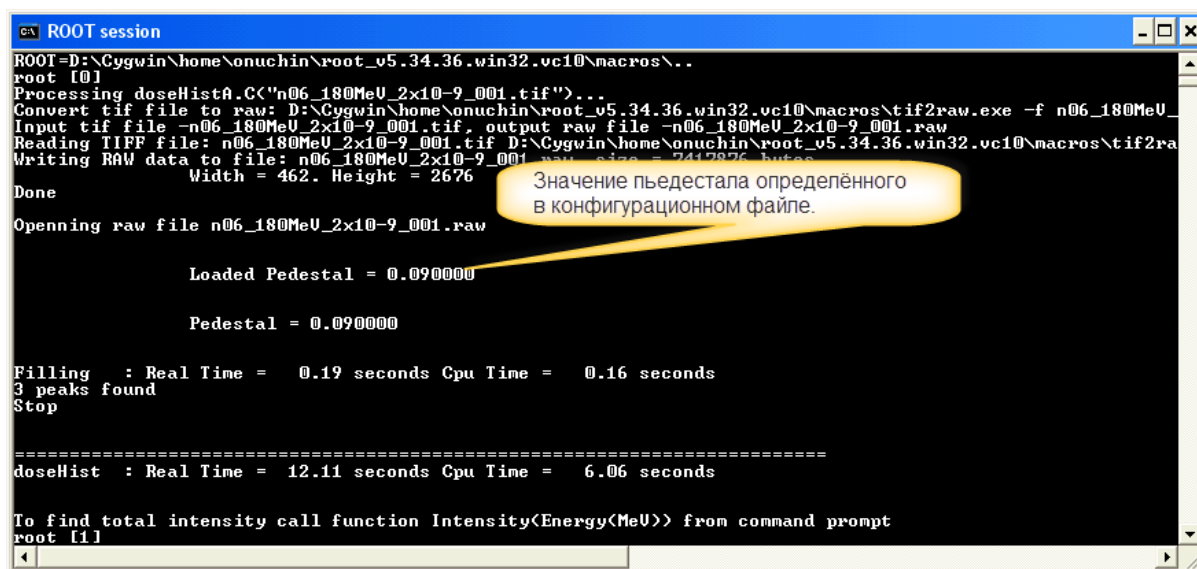
ROOTa,

4.10

- doseConfig.h

double gPedestal,

gPedestal



```

C:\ ROOT session
ROOT=D:\Cygwin\home\nouchin\root_v5.34.36.win32.vc10\macros\..
root [0]
Processing doseHistA.C<"n06_180MeV_2x10-9_001.tif">...
Convert tif file to raw: D:\Cygwin\home\nouchin\root_v5.34.36.win32.vc10\macros\tif2raw.exe -f n06_180MeV_
Input tif file -n06_180MeV_2x10-9_001.tif, output raw file -n06_180MeV_2x10-9_001.raw
Reading TIFF file: n06_180MeV_2x10-9_001.tif D:\Cygwin\home\nouchin\root_v5.34.36.win32.vc10\macros\tif2ra
Writing RAW data to file: n06_180MeV_2x10-9_001.raw size = 7417876 bytes
Width = 462. Height = 2676
Done
Opening raw file n06_180MeV_2x10-9_001.raw

Loaded Pedestal = 0.090000

Pedestal = 0.090000

Filling : Real Time = 0.19 seconds Cpu Time = 0.16 seconds
3 peaks found
Stop

=====
doseHist : Real Time = 12.11 seconds Cpu Time = 6.06 seconds

To find total intensity call function Intensity<Energy[MeV]> from command prompt
root [1]

```

Значение пьедестала определённого в конфигурационном файле.

ros

%ROOTSYS%\mac-

fig.h),

(doseCon-

TIFF

5

EBT

Из под папки, содержащую калибровочные файл , запускаем **root.**
Далее, и **ROOTа** **calibrate.C**

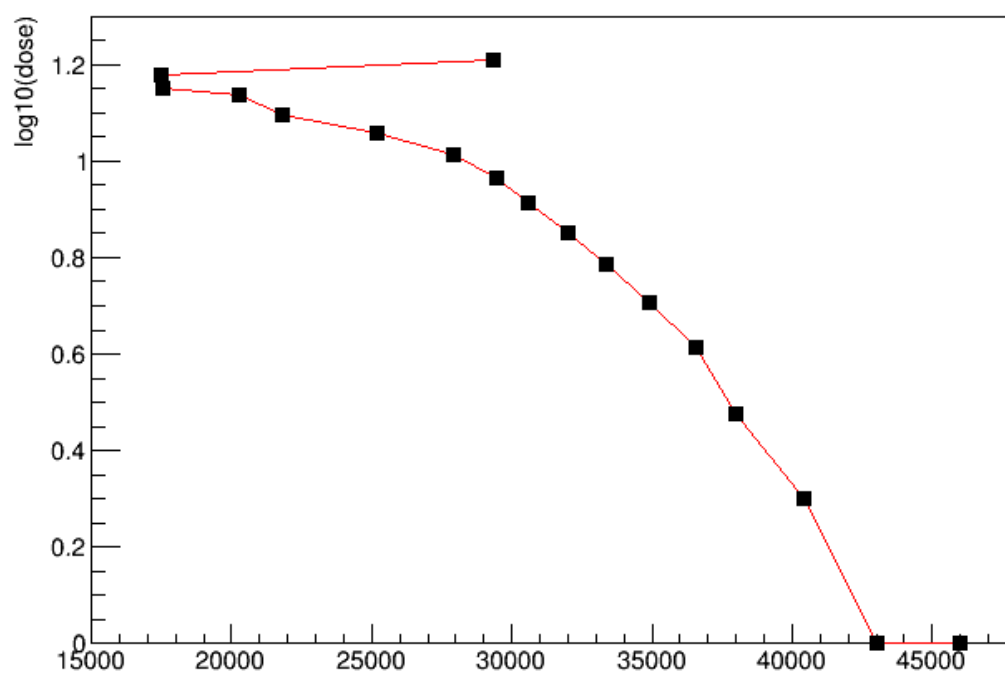
```
C:\ ROOT session
*****
*      W E L C O M E  t o  R O O T      *
*      *      *      *      *      *      *
*      Version   5.34/05  14 February 2013  *
*      *      *      *      *      *      *
*      You are welcome to visit our Web site  *
*      http://root.cern.ch                    *
*      *      *      *      *      *      *
*****

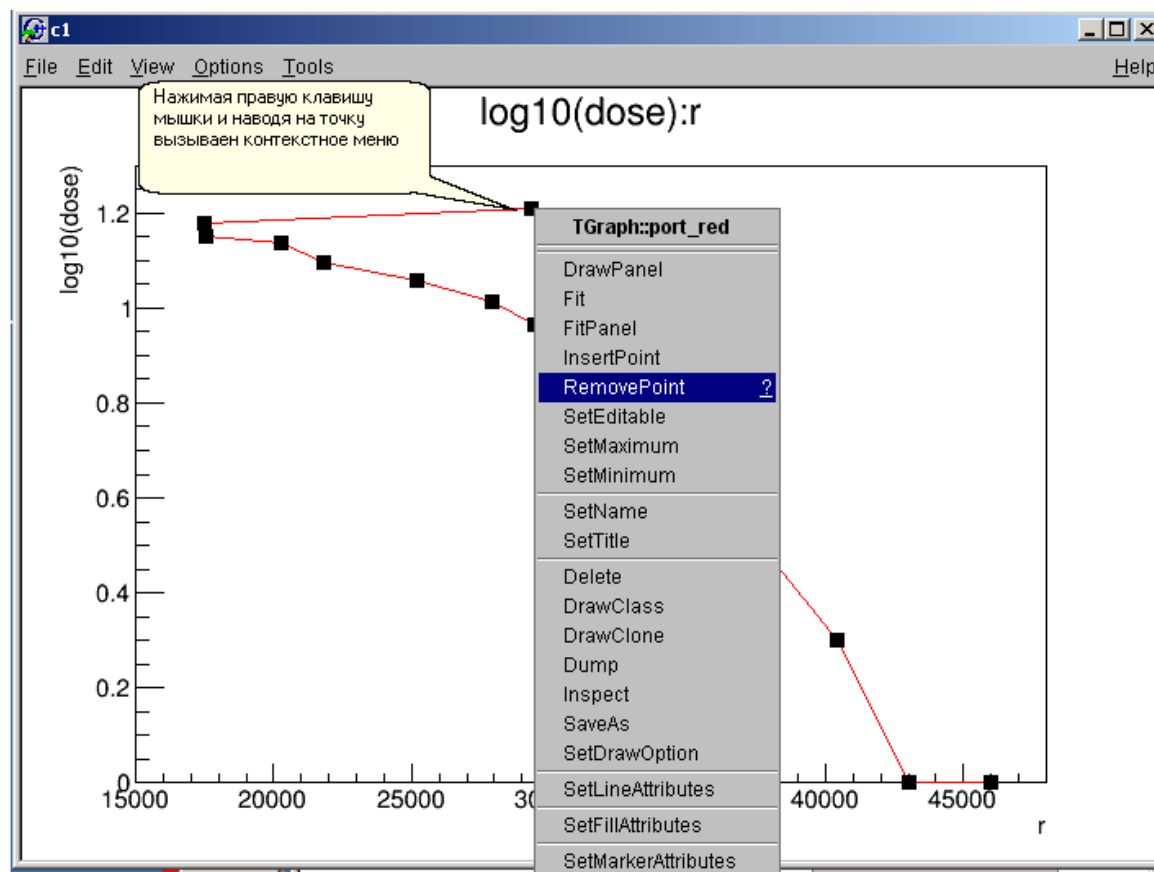
ROOT 5.34/05 <Mar 19 2013, 09:19:15e48568, Mar 19 2013, 09:52:15 on win32>

CINT/ROOT C/C++ Interpreter version 5.18.00, July 2, 2010
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
root [0] .x calibrate.C
      команда запуска
```

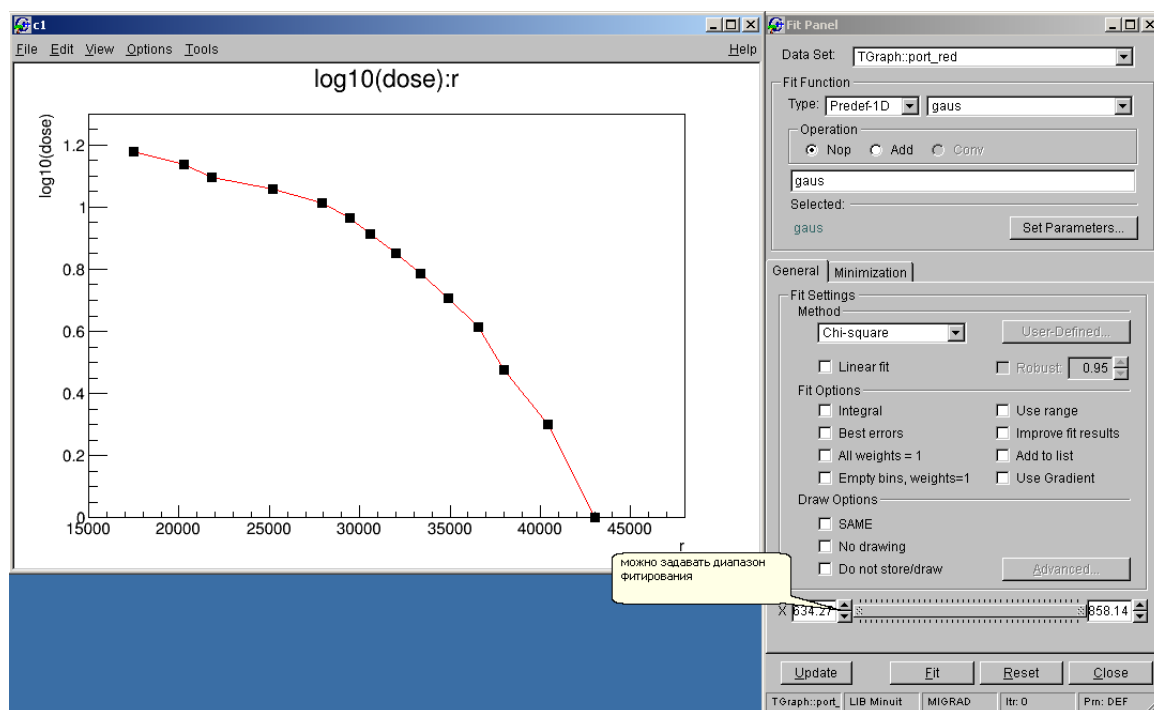
калибровочных

$\log_{10}(\text{dose}):r$





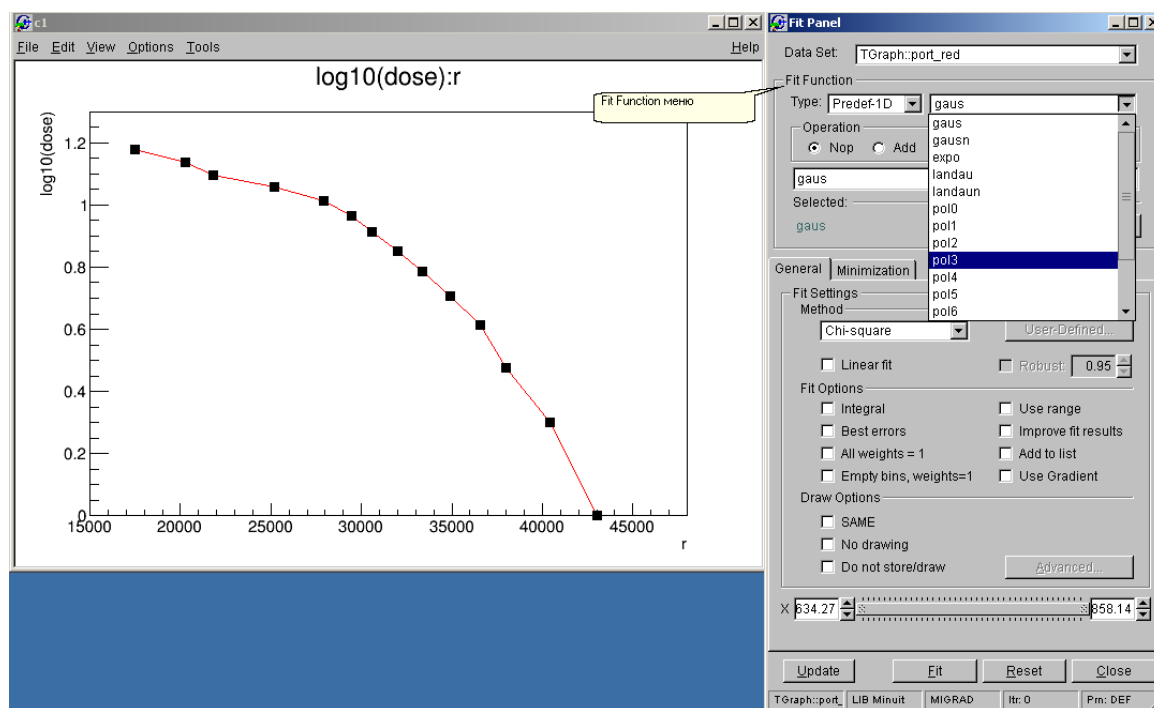
FitPanel



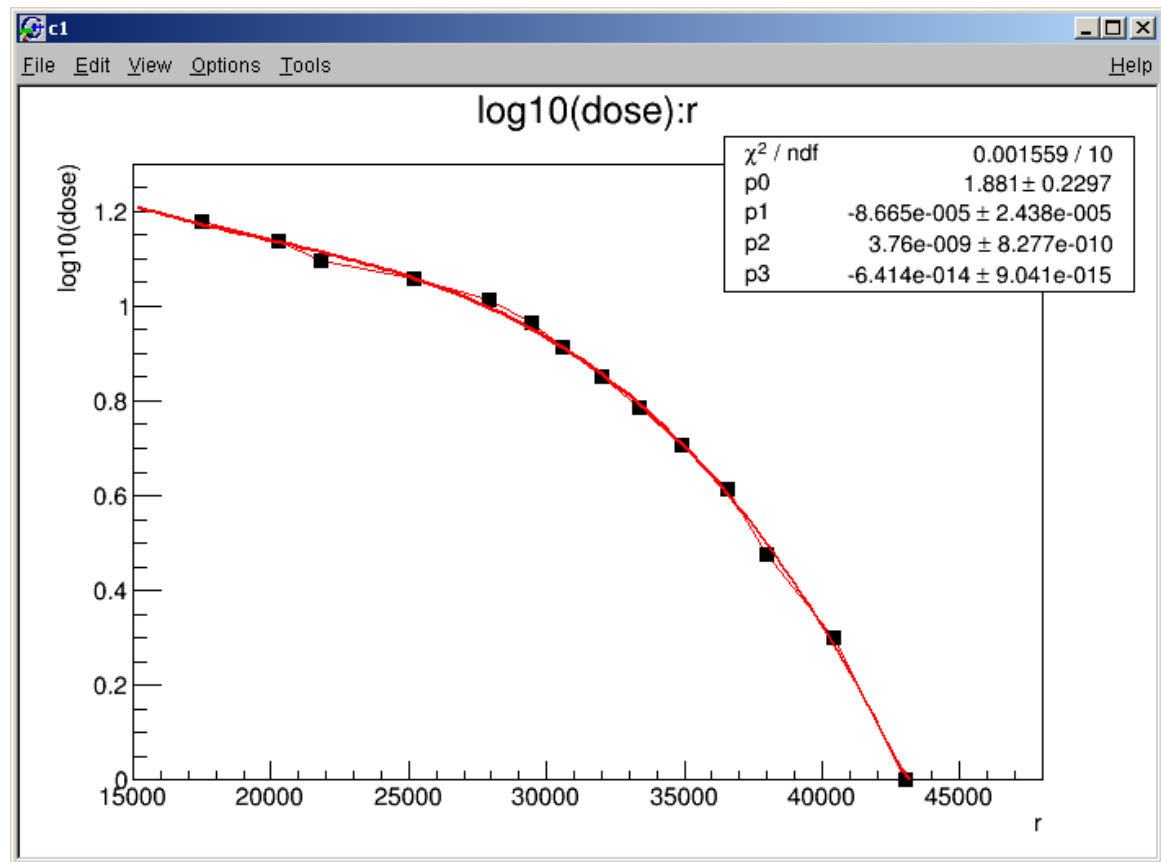
Fit Function

pol3 (

).



(p0, p1, p2, p3).



ROOT

CreateCalibrFile()


```

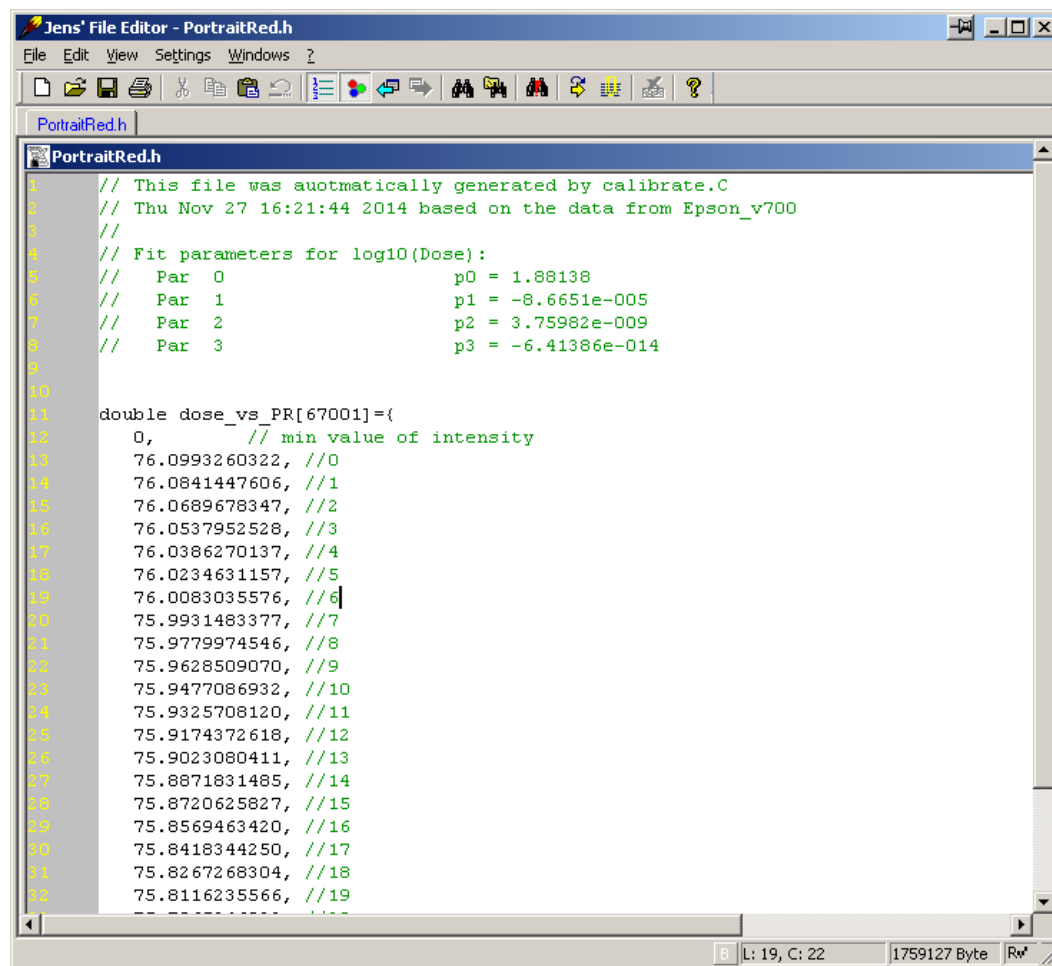
Select ROOT session
Processing file - P_n11_4_Gy_001.raw
Processing file - P_n12_5_Gy_001.raw
Processing file - P_n13_7_Gy_001.raw
Processing file - P_n14_10_Gy_001.raw
Processing file - P_n15_10_Gy_001.raw
Processing file - P_n16_2_50_Gy_001.raw
Processing file - dosePortrait.root ...
File calibrPortrait.root created
Warning in <TFile::Append>: Replacing existing TH1: port_red <Potential memory leak>.
root [1]
*****
Minimizer is Minuit / Migrad
Chi2          = 0.0908148
NDF           = 11
Edm           = 1.84121e-007
NCalls        = 329
Constant      = 1.17169 +/- 0.0414383
Mean          = 22140.6 +/- 1166.86
Sigma         = 11583.2 +/- 1026.62 <limited>
*****
Minimizer is Linear
Chi2          = 0.001559
NDF           = 10
p0            = 1.88138 +/- 0.229733
p1            = -8.6651e-005 +/- 2.43841e-005
p2            = 3.75982e-009 +/- 8.27674e-010
p3            = -6.41386e-014 +/- 9.04079e-015
root [1]
root [1] CreateCalibrFile<>_

```

PortraitRed.h,

include file
 #include "PortraitRed.h"
 C/C++.

:



PortraitRed.h, PortraitRedCalibr.C
%ROOTSYS%/macros,

6

ROOT

•

1. **Cygwin** — UNIX-Windows. **Cygwin** Windows

Cygwin

Cygwin Windows.

Microsoft
,
Windows,

Cygwin

<https://cygwin.com/>

2. Microsoft Visual Studio 2010

3. ROOT

Microsoft Visual Studio 2010.

- root_v5.34.32.win32.vc10.exe

4. bash

Cygwin:

bash_profile, vsvars10.sh

%ROOTSYS%\macros.

\$HOME

, D:\Cygwin\home\onuchin

doseHist.C

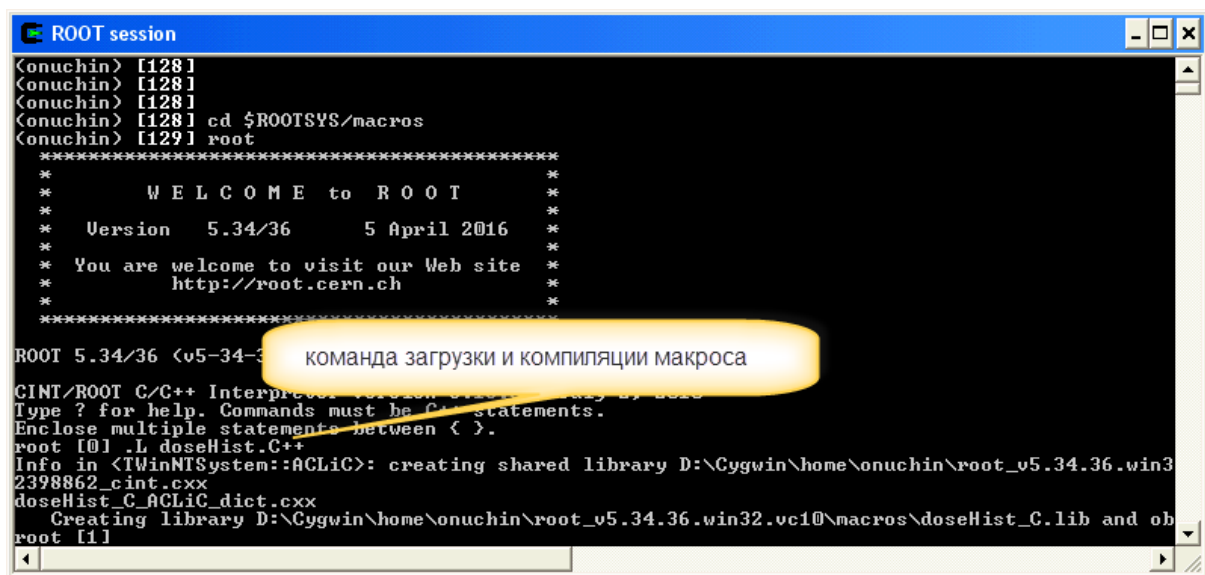
cygwin

```

Shortcut to Cygwin.bat
Setting environment for
(onuchin) [128]
(onuchin) [128]
(onuchin) [128]
(onuchin) [128] cd $ROOTSYS/macros
(onuchin) [129]
  
```

ROOT,

.L doseHist.C++



```
ROOT session
<onuchin> [128]
<onuchin> [128]
<onuchin> [128]
<onuchin> [128] cd $ROOTSYS/macros
<onuchin> [129] root
*****
*          W E L C O M E  t o  R O O T          *
*
*   Version   5.34/36      5 April 2016         *
*
*   You are welcome to visit our Web site      *
*           http://root.cern.ch                *
*
*****
ROOT 5.34/36 <v5-34-3>
CINT/ROOT C/C++ Interpreter Version 5.34/36
Type ? for help. Commands must be C++ statements.
Enclose multiple statements between { }.
root [0] .L doseHist.C++
Info in <TWinNTSystem::ACLiC>: creating shared library D:\Cygwin\home\onuchin\root_v5.34.36.win3
2398862_cint.cxx
doseHist_C_AcLiC_dict.cxx
Creating library D:\Cygwin\home\onuchin\root_v5.34.36.win32.vc10\macros\doseHist_C.lib and ob
root [1]
```

команда загрузки и компиляции макроса

DLL (« »)

doseHist_C.dll

- F -

FAQ for upgraders 3

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