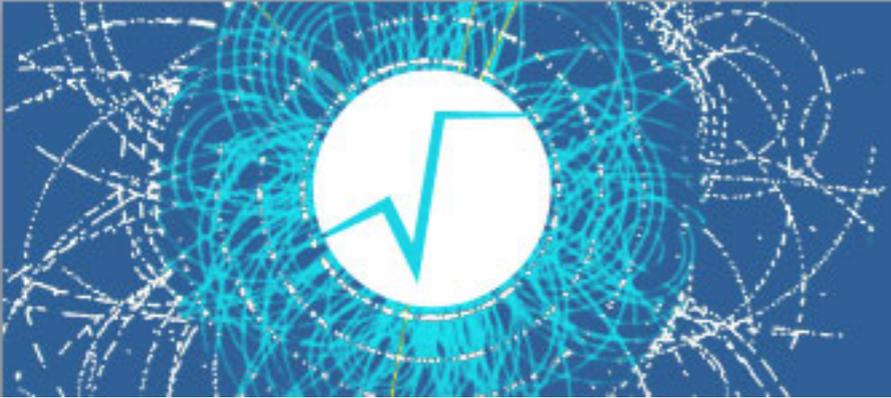


ROOT Graphics

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Abstract

Graphics News: new Palettes, Transparency, Interactive editing, LaTeX Dump...
ROOT graphics had many developments since the last workshop. We will summarise them, emphasising the most recent and noticeable ones and give an overview on the ongoing and planned projects.



New Palettes

- The palettes can be accessed by name with `gStyle->SetPalette(num)`. `num` can be taken within the following enum:

```
kDeepSea=51,          kGreyScale=52,      kDarkBodyRadiator=53,
kBlueYellow= 54,     kRainBow=55,       kInvertedDarkBodyRadiator=56,
kBird=57,           kCubehelix=58,     kGreenRedViolet=59,
kBlueRedYellow=60,  kOcean=61,         kColorPrintableOnGrey=62,
kAlpine=63,         kAquamarine=64,    kArmy=65,
kAtlantic=66,       kAurora=67,        kAvocado=68,
kBeach=69,          kBlackBody=70,     kBlueGreenYellow=71,
kBrownCyan=72,      kCMYK=73,          kCandy=74,
kCherry=75,         kCoffee=76,        kDarkRainBow=77,
kDarkTerrain=78,   kFall=79,          kFruitPunch=80,
kFuchsia=81,        kGreyYellow=82,    kGreenBrownTerrain=83,
kGreenPink=84,      kIsland=85,        kLake=86,
kLightTemperature=87, kLightTerrain=88,  kMint=89,
kNeon=90,           kPastel=91,        kPearl=92,
kPigeon=93,         kPlum=94,          kRedBlue=95,
kRose=96,           kRust=97,          kSandyTerrain=98,
kSienna=99,         kSolar=100,        kSouthWest=101,
kStarryNight=102,  kSunset=103,       kTemperatureMap=104,
kThermometer=105,  kValentine=106,    kVisibleSpectrum=107,
kWaterMelon=108,   kCool=109,         kCopper=110,
kGistEarth=111     kViridis=112
```



New Palettes

- The new palettes are defined with 255 colors. Many names and colors' definitions have been taken from <http://www.rcnp.osaka-u.ac.jp/~noji/colormap>.

PICTURES



New Palettes

- The default is now:

PICTURES



Transparency

Is now an attribute like any other:

can be change form the Graphics editor

can be visible on screen via Quartz (Mac) and OpenGL (see OpenGL backend) on all platforms

Can be output with PDF, SVG, TeX, PNG, JPG ...

PICTURES



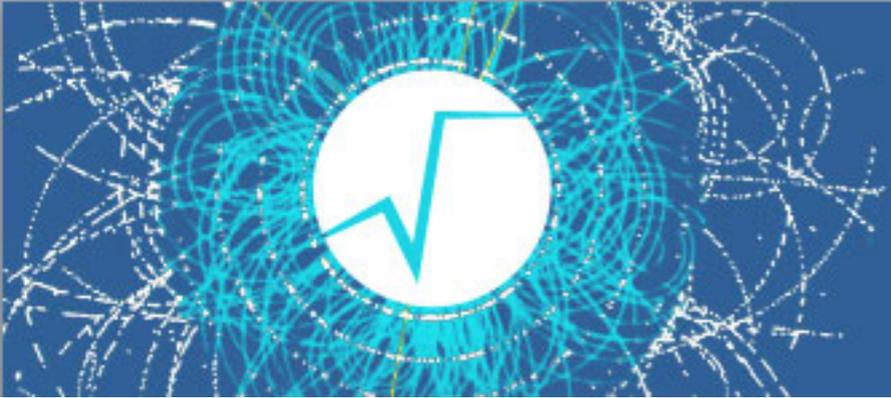
Interactive editing

Move opaque (default) -> example

Guide lines (default, can be turned off) . For example interactive move of a piece of text on the graphics window is guided by some rulers allowing a good alignment against other objects presents on the canvas. -> example

==> Both make the Toolbar much more useful than in the past

PICTURES/ANIMATIONS



LaTeX Dump

TTexDump -> graphics output in pure L^ATeX ... -> example

PICTURES



OpenGL Backend

Can be used as default. via `rootrc` -> example

can become the default backend-> has transparency

PICTURES

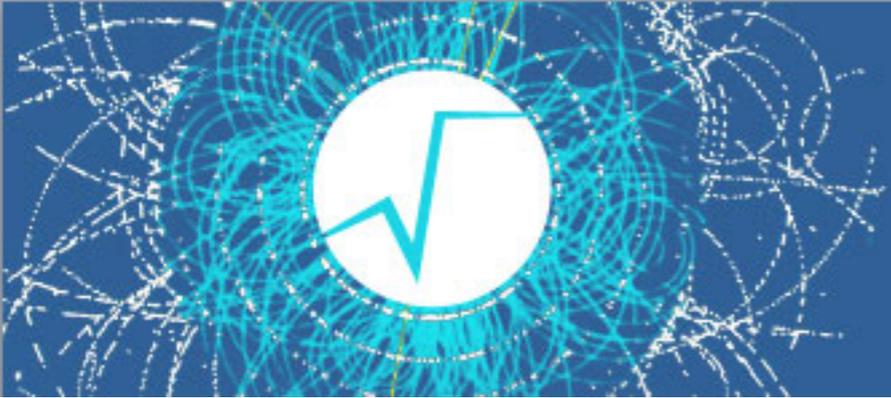


Improvements in graphics output

Graphics output is an essential part of the formats (PDF, PS, Jpeg, PNG, TeX, SVG, Gif...) this is essential for physics result publication either in papers or on the web. Many improvements have been done in that area.

Here is a partial list of the various improvements done in that area.

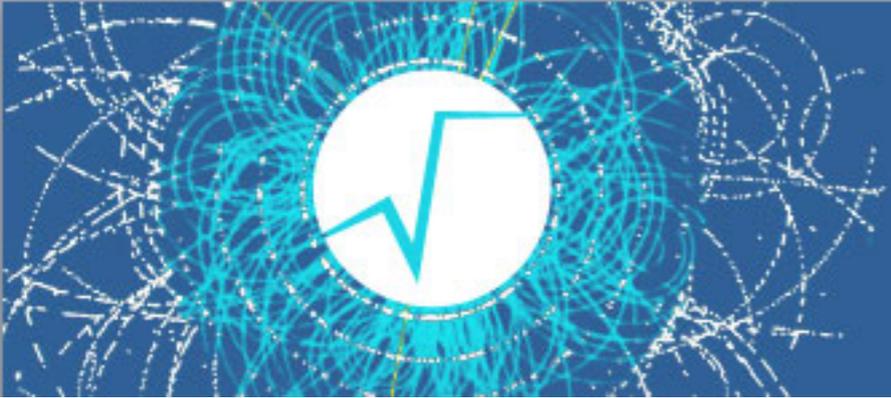
- Implement missing math symbols in SVG output.
- Improvements in TPDF and TPostScript for fill patterns 1, 2 and 3.
- With the new Cocoa backend on Mac, the PDF and PS output produced miss-aligned exponents.
- Transparency implemented for TeX output.
- Better line width matching with screen and PDF output.
- When a text size was equal or smaller than 0 the PDF file was corrupted.
- In the new TeX output the underscore `_` produced an error outside the TeX math context.
- Use float numbers instead of integer to describe graphics paths in SVG output in order to avoid rounding problems.
- The hollow fill style was not rendered correctly by the new TeX output.
- With the new Cocoa backend on Mac the text strings were a bit too large compared to the TTF rendering.
- In the new TeX output the text color was ignored.
- The marker definition in the new TeX output was misplaced.



Improvements in text graphics

ROOT text graphics rendering is very close to text processing as it covers most of the LaTeX capabilities for math formulae display. Constant improvements and bug fixes are needed. Specially with the new class TMathText and the new output backend like TeX. Here is a short list of some of the improvements:

- TLatex: Improve the square-root drawing in case it is small.
- TLatex with the Cocoa backend: In some cases, the character positioning was not correct .
- Implement typographically correct minus sign for axis labels and stats. **PICTURE**
- TLatex interface to TMathText did not work in case the text size was specified in dots.
- Fix size issues with the FTGL text.
- Make TMathText work with FTGL (this was part of the OpenGL backend consolidation. See above).

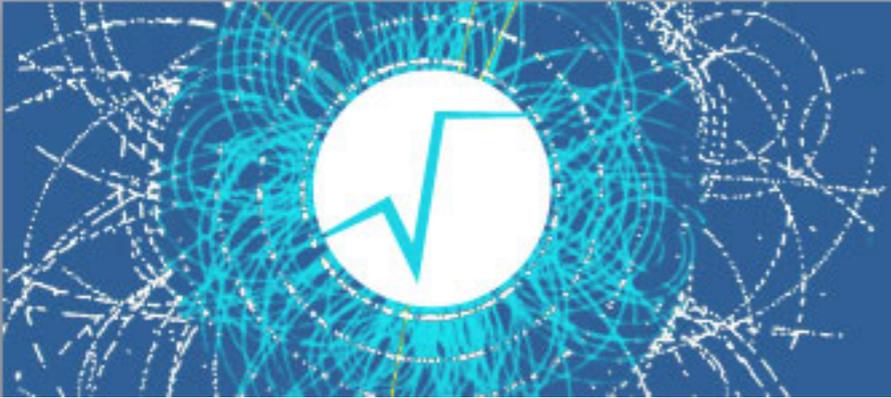


New visualisation techniques

ROOT users constantly request new visualisation techniques. They sometimes are implemented in close collaboration with users. Also some improvements are required for existing visualisation techniques. Here is a list of implementations and improvements:

- New drawing option "violin" for 2D histograms.
- Implement the option FUNC for 2D histograms.
- In some cases an extra point was drawn when a TGraph2D was drawn with P, P0 or PCOL options.
- Fix an issue with E0 option and log scale.
- Improve the BOX drawing option for 2D histograms.
- Implement this option `pads`. This option is equivalent to the one in `THStack`. It allows to draw all the `TGraphs` in separated pads.
- The histogram drawing option allowing to compress line drawing of histogram with many bins as been removed. It is not needed anymore since the line compression has been implemented in `TPadPainter`.

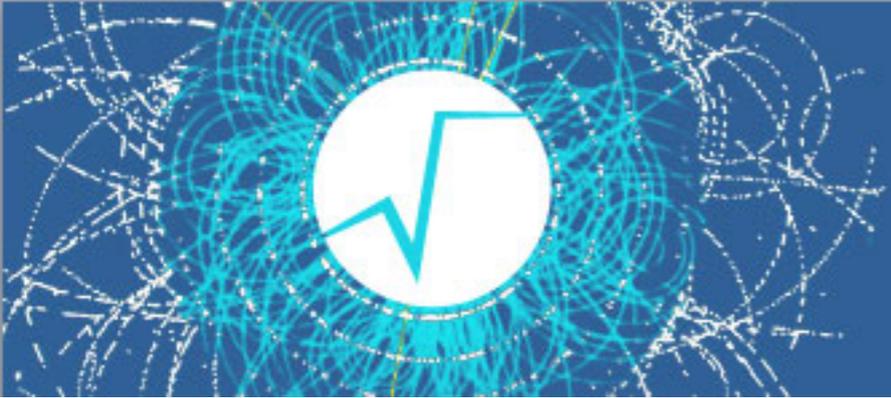
PICTURES



Other improvements.. (???)

Various other improvements not related to the previous items were also implemented. Here is a list of few of them:

- It was possible to interactively zoom outside the histograms' limits. Protections have been added. - TGaxis::SetMaxDigits() was not active on standalone TGaxis.
- Add color setters allowing the transparency definition.
- Fix some alignment issue in TLegend.
- Introduce the flag `CanvasPreferGL` in `rootrc.in`. So OpenGL can be use by default. The default value for this flag is 0 (no OpenGL).
- TPad::Print() really works on TCanvas only. A protection has been added in case it is called on a pure TPad.



Future work

- Finalize Open GL as default
- Complete TMathText
- Reverse user space for astronomy
- XKCD plot (mathematica has it)?
- Enhance the plotting options for horizontal histogram plots.
- Symlog scale
- New option for THStack

