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The ROOT's GUI classes support an extensive and rich set of widgets. These widget classes interface to the underlying graphics system and OS via abstract classes - **TVirtualX** and **TSystem**. Concrete versions were implemented for X11/*nix, Win32, Qt and **now Mac OS X**:

ROOT GUI applications (browsers, canvases, treeplayers, event displays) and user GUI applications

ROOT GUI framework (windows/widgets/controls classes)

Abstraction layer: TSystem, TVirtualX

TMacOSXSystem: event handling/dispatch (mouse/keyboard/geometry change/repaint events, I/O activity, etc.)

TGCocoa/TGQuartz: 2D/3D graphics (**graphical "back-end"**), window management, font management, cursors, drag and drop, etc.

New graphical back-end for Mac OS X:

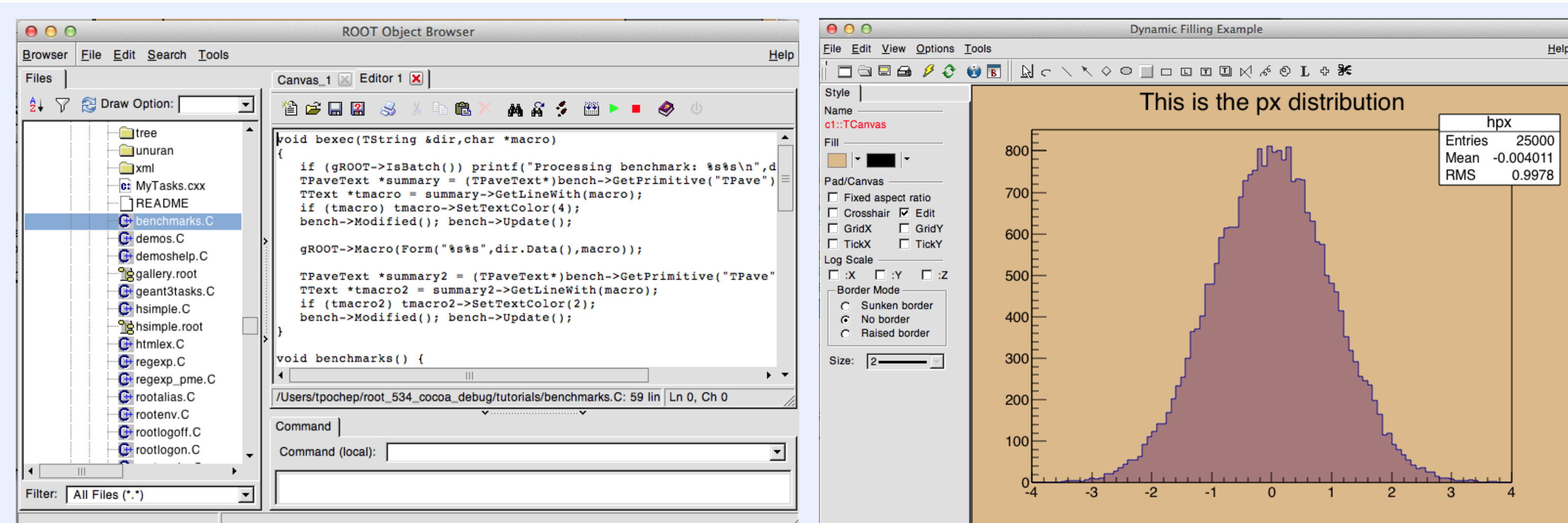
- is a **complete** implementation of **TVirtualX** interface;
- uses **native APIs directly**, no external X11-server application (XQuartz) required;
- 2D graphics – **font, line, polygon anti-aliasing**;
- 2D graphics – **transparency and gradients**;
- **"Retina-friendly"**;
- can mix with **native GUI-controls** (Apple's Aqua UI)
- in future can support **multi-threaded GUI**;
- implemented in **Objective-C++**.

Availability:

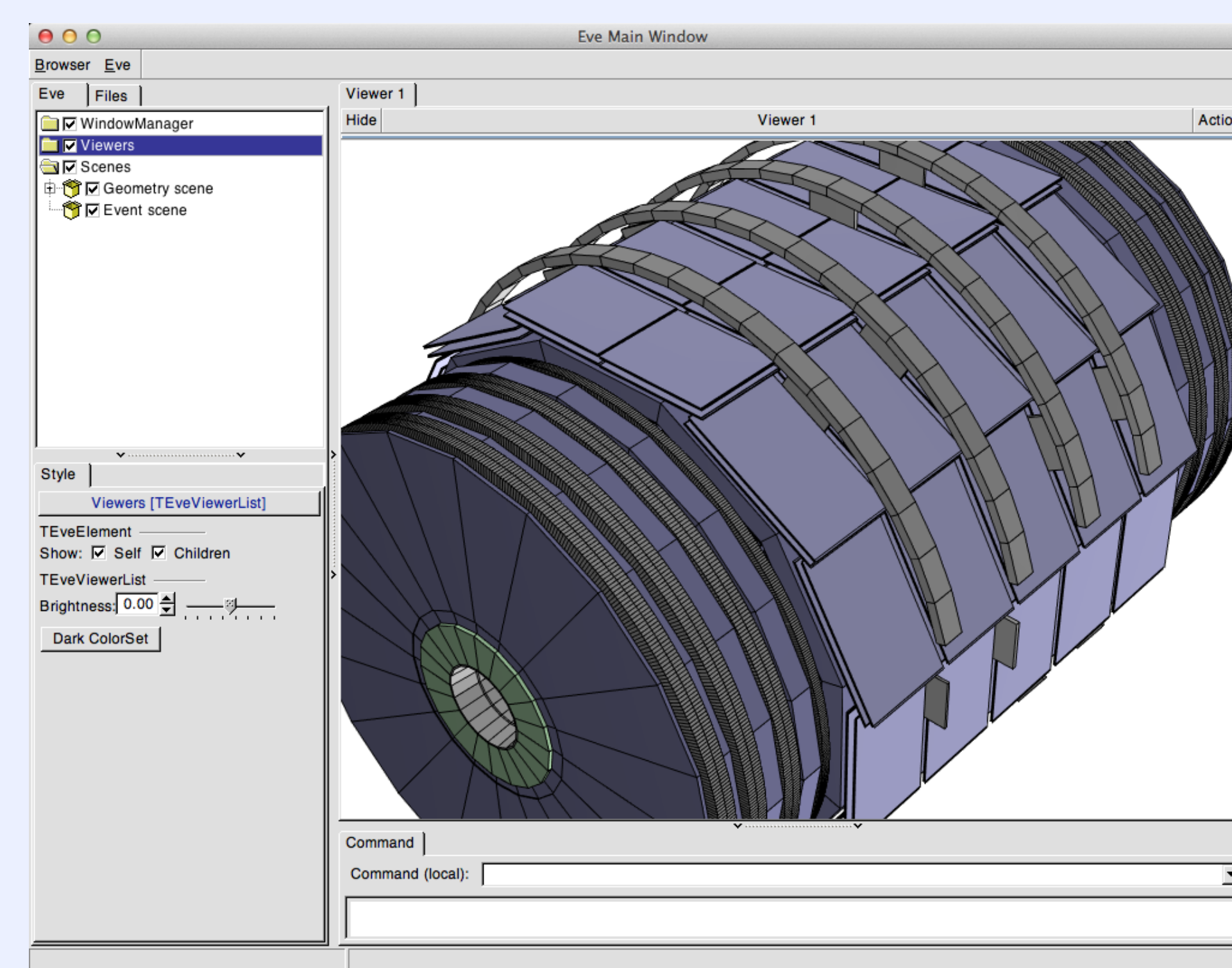
- Needs **Mac OS X >= 10.7**;
- **XCode >= 4.x** (Apple-provided clang version >= 4.2);
- Part of **ROOT v. 5-34** (**--enable-cocoa** configure option)
- **Default in the trunk version**.

Components (implementation):

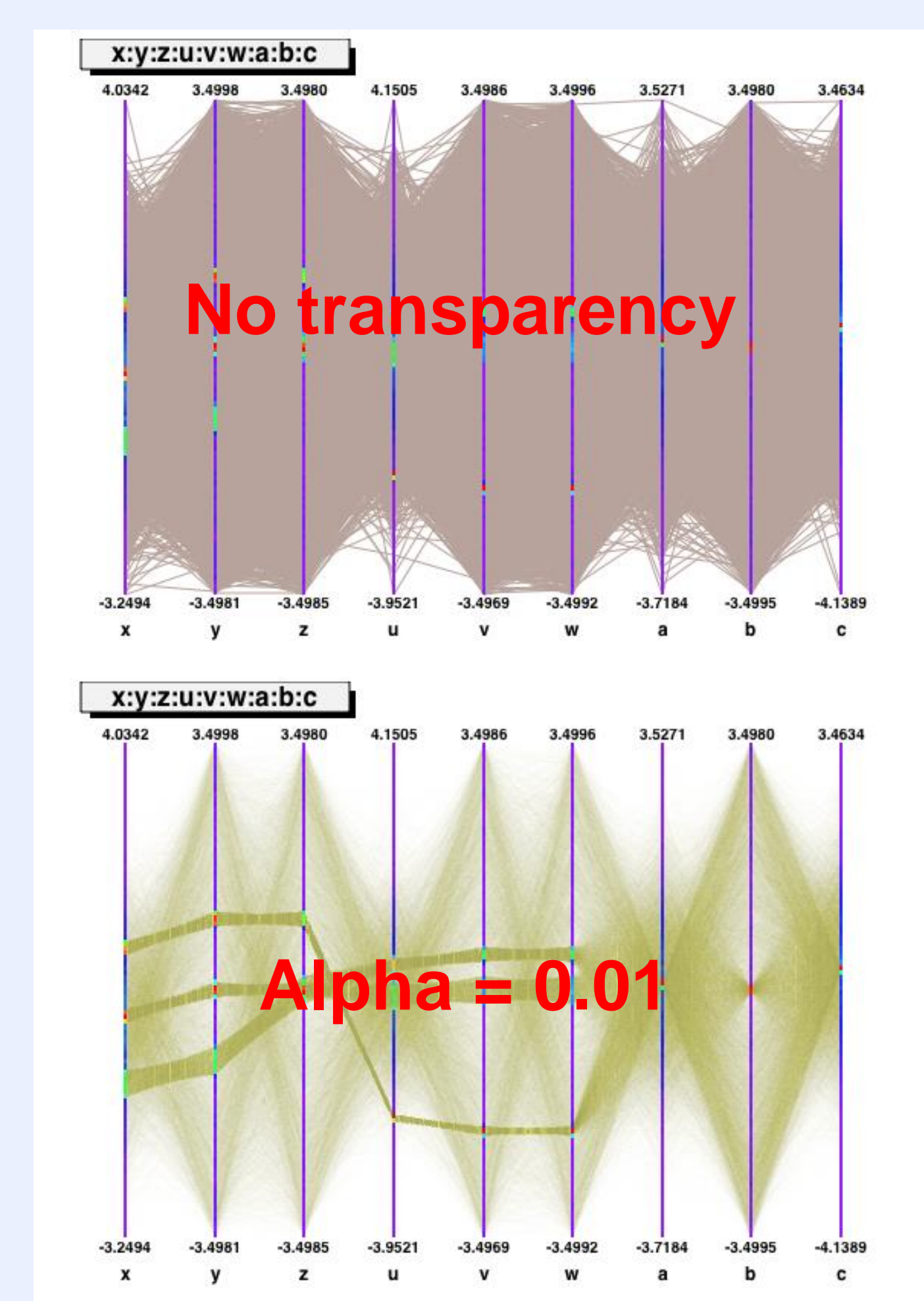
- **Window manager** uses Apple's **Cocoa** framework (object oriented framework written in Obj-C) and Apple's **Quartz Window Server** API.
- **I/O activity, GUI events, event loop** - based on **Cocoa** and Apple's **Core Foundation** framework
- **"Event translator"** – translates native GUI events into "X11-like" events/emulates X11 events (X11 events required by ROOT's GUI to work)
- **2D graphics** – implemented with Apple's **Quartz 2D API, Core Image** and **Core Text** frameworks
- **3D graphics (OpenGL)**: window/context/pixel format management – **Cocoa** framework.



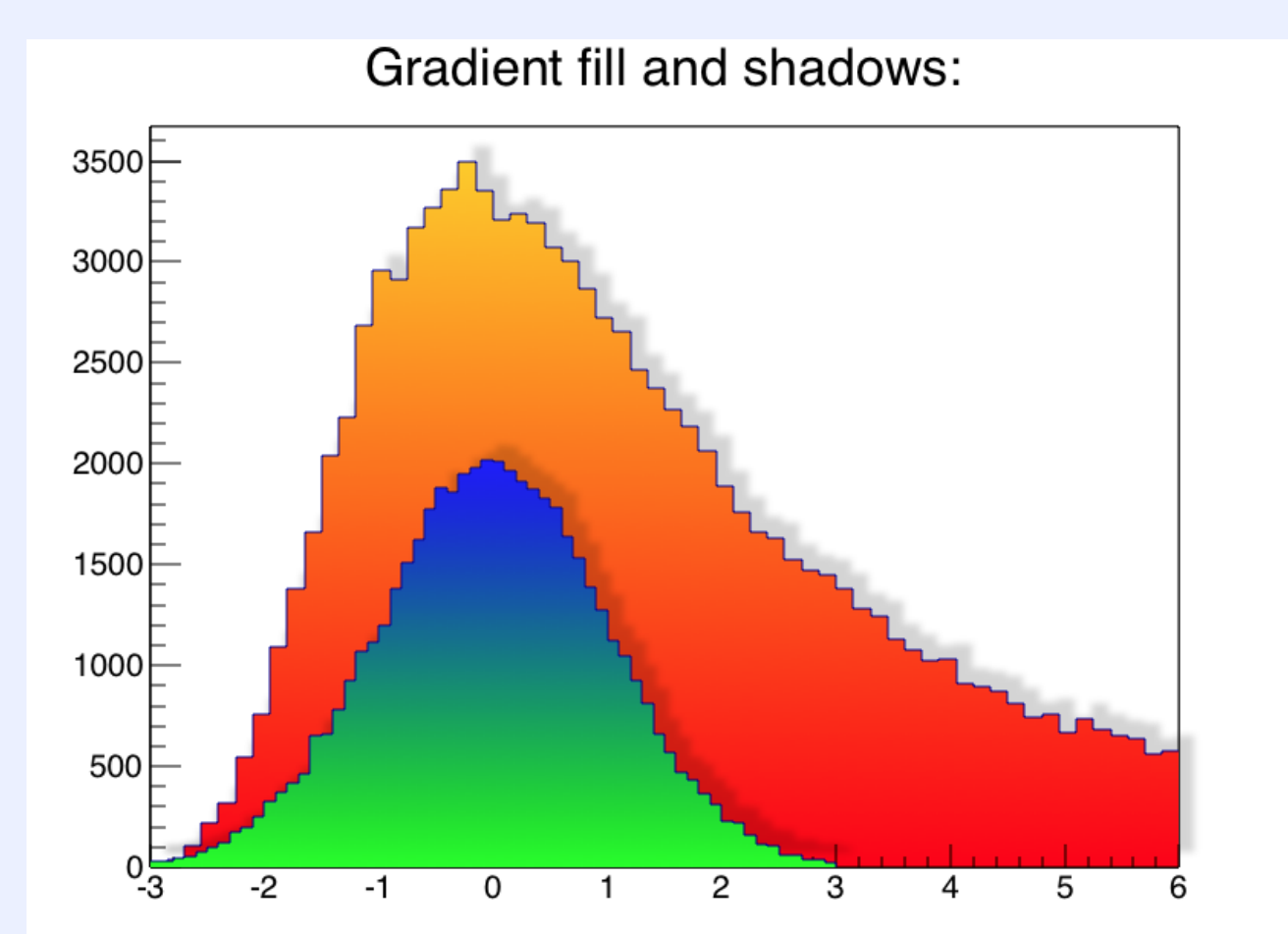
Standard ROOT GUI fully implemented with Cocoa



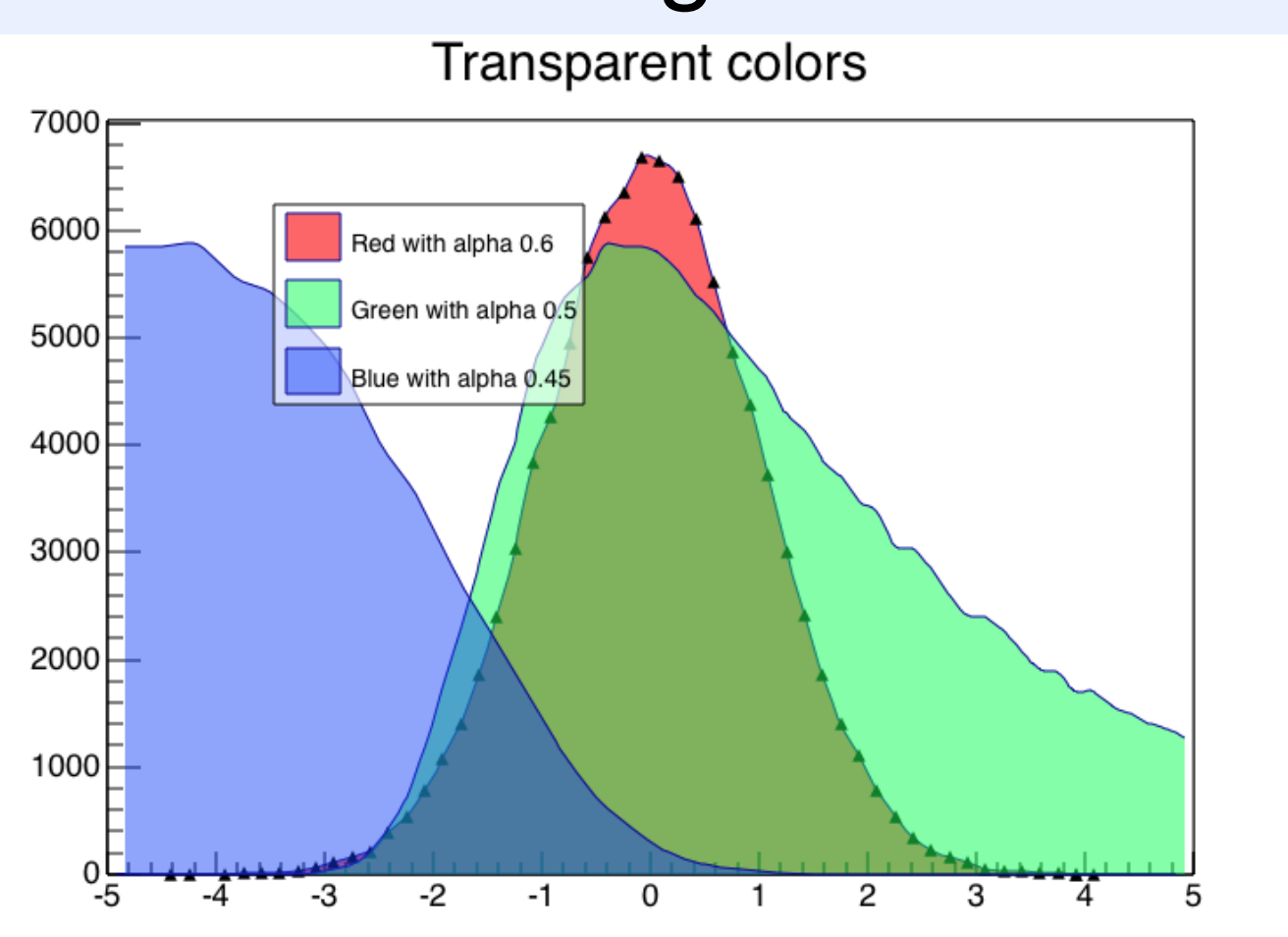
OpenGL: event displays Eve and Fireworks (CMS)



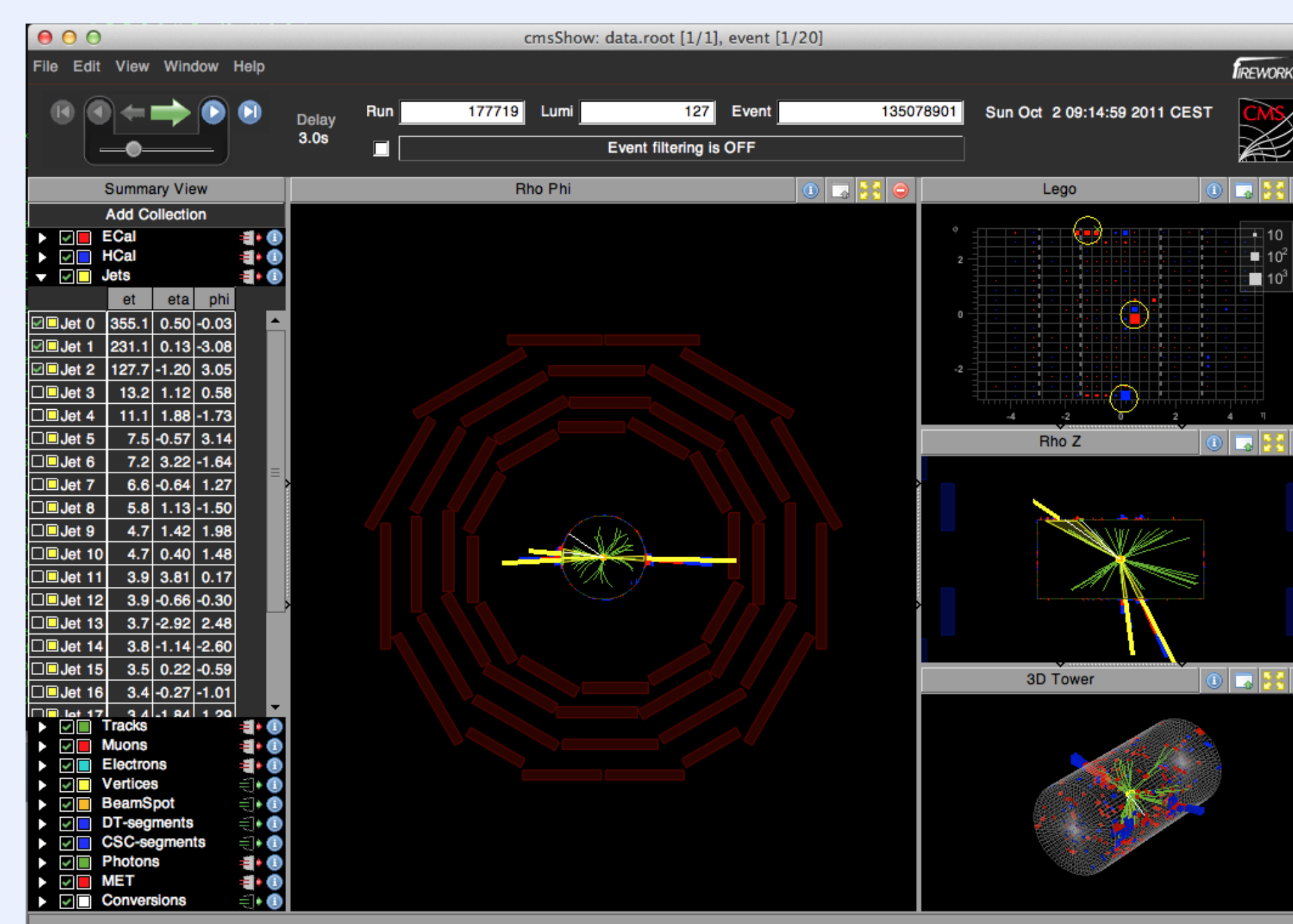
Parallel coordinates with transparent lines



New color gradient fill



Transparent objects



For more information see: <http://root.cern.ch>
For any questions please use following address: rootdev@root.cern.ch