ROOT Users Workshop 2013

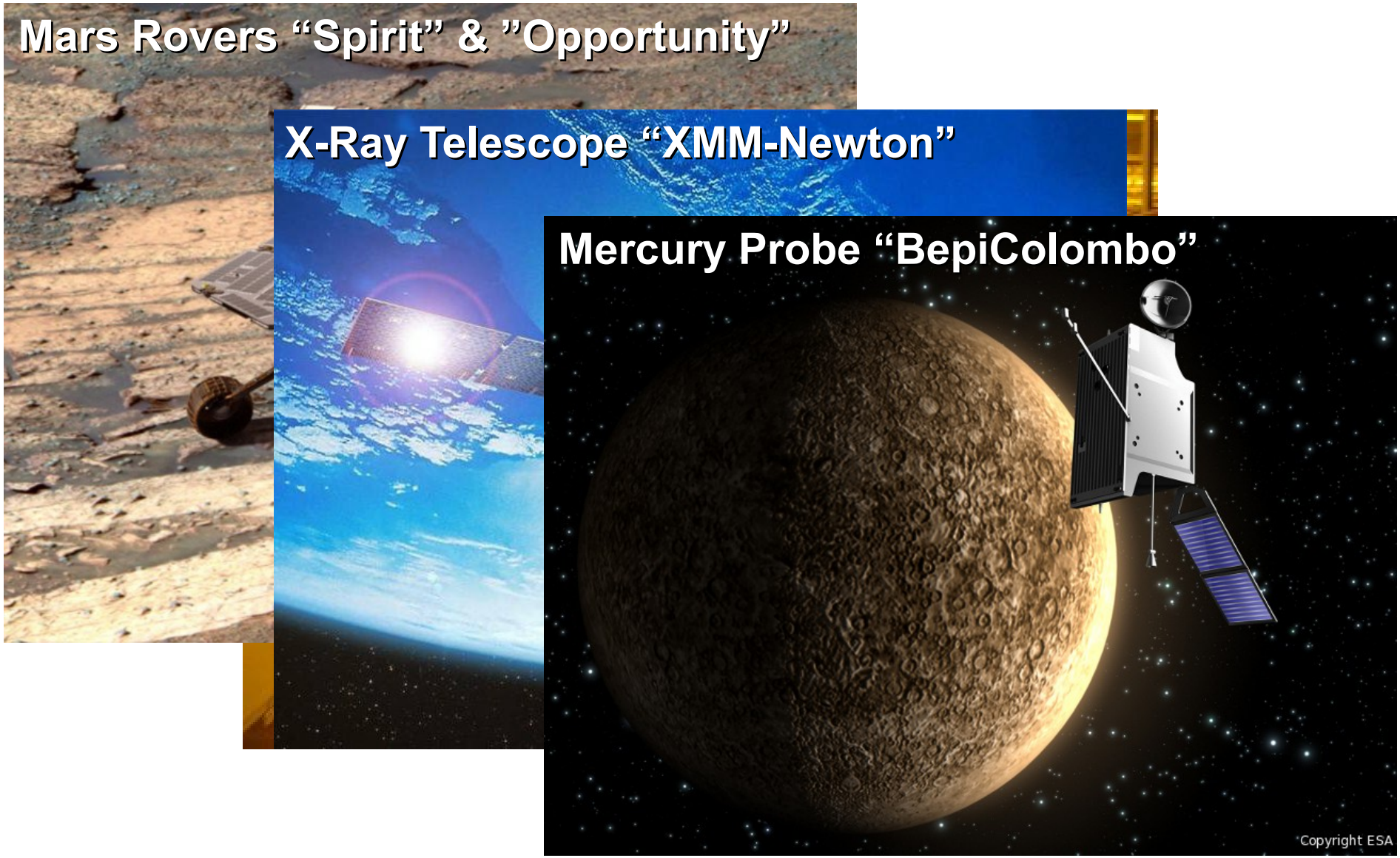
ROAn, a ROOT based Analysis Framework

(not only) for DePFET detector data

Thomas Lauf & Robert Andritschke

ROOT Users Workshop
2013-03-11

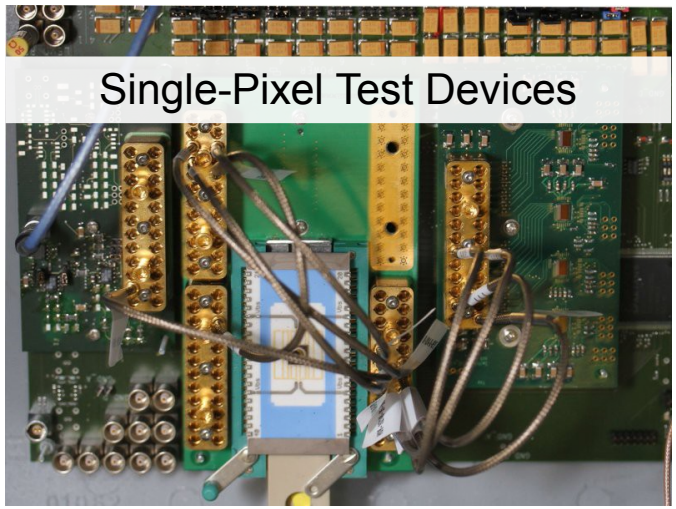
The MPI Semiconductor Laboratory



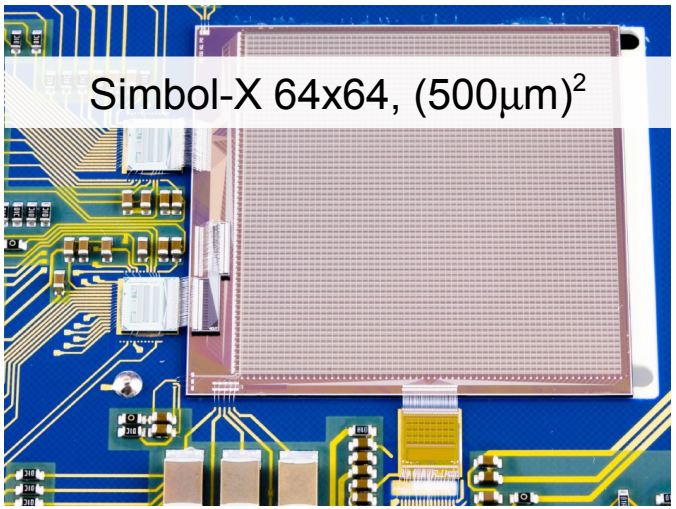
DePFET Detectors

Depleted P-channel Field Effect Transistors

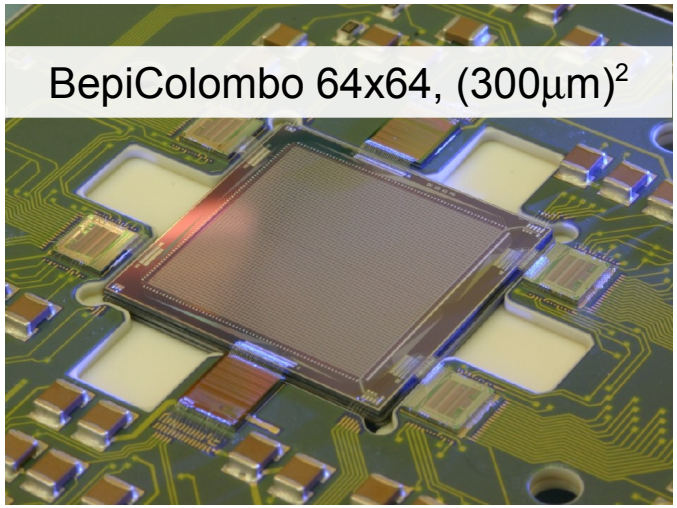
Single-Pixel Test Devices



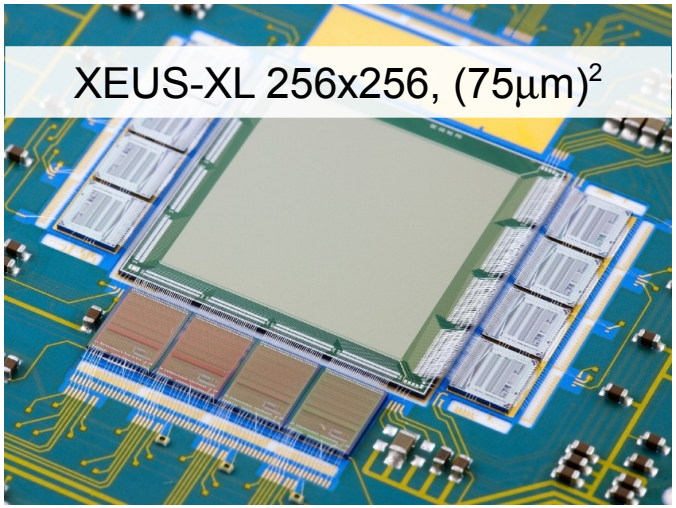
Simbol-X 64x64, $(500\mu m)^2$



BepiColombo 64x64, $(300\mu m)^2$

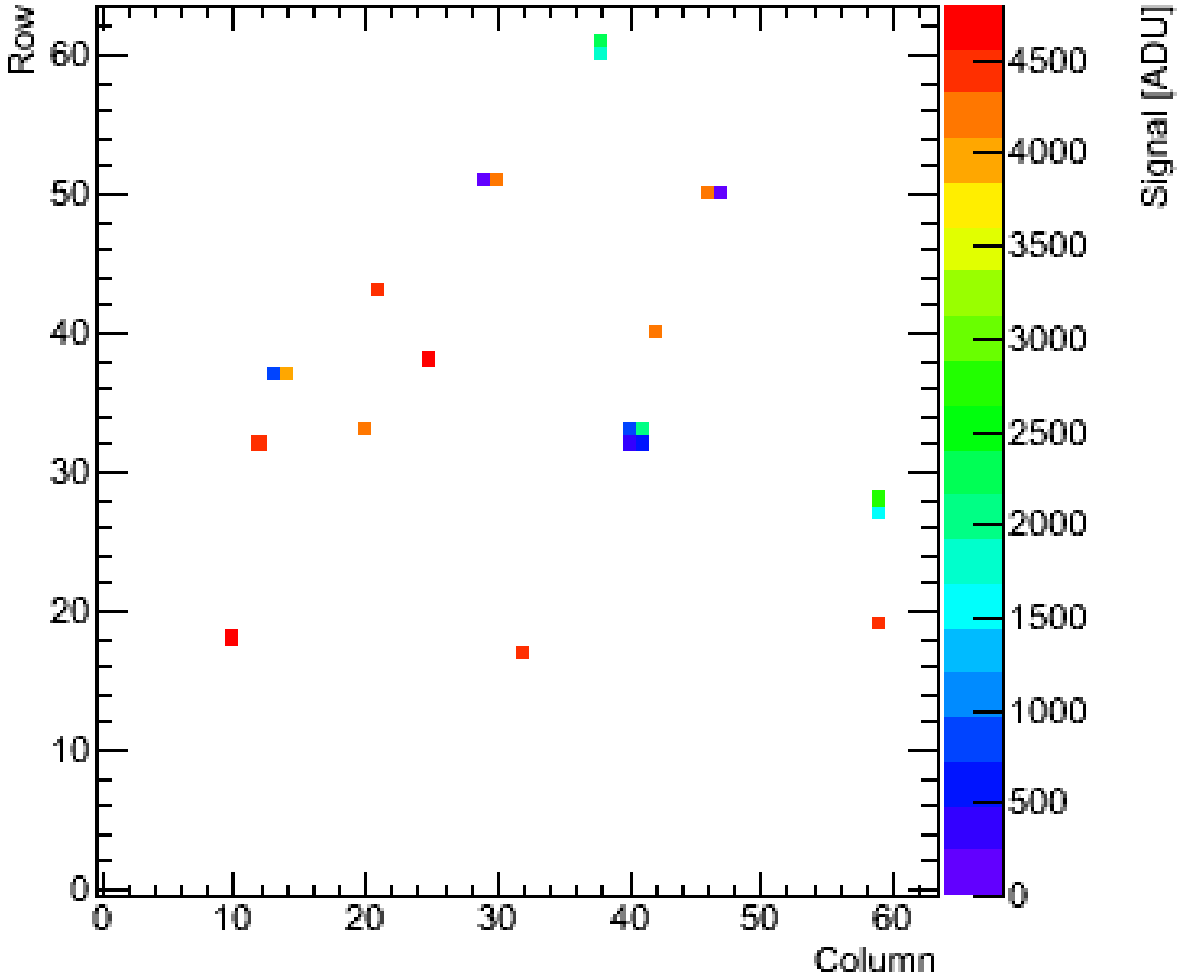


XEUS-XL 256x256, $(75\mu m)^2$



DePFET Detectors

Data Example



- Raw data frame
- Offset corrected frame
- Threshold application
- Pattern search

Pattern list entry:

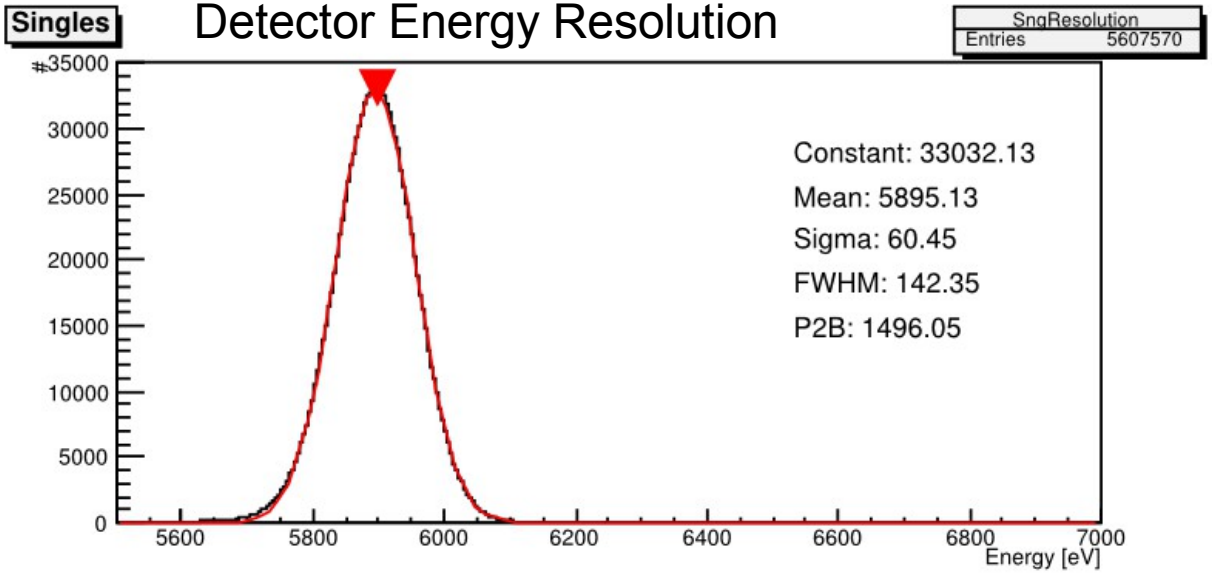
```
- NSignals
- Col[NSignals]
- Row[NSignals]
- Signal[NSignals]
- ...
```

DePFET Detectors

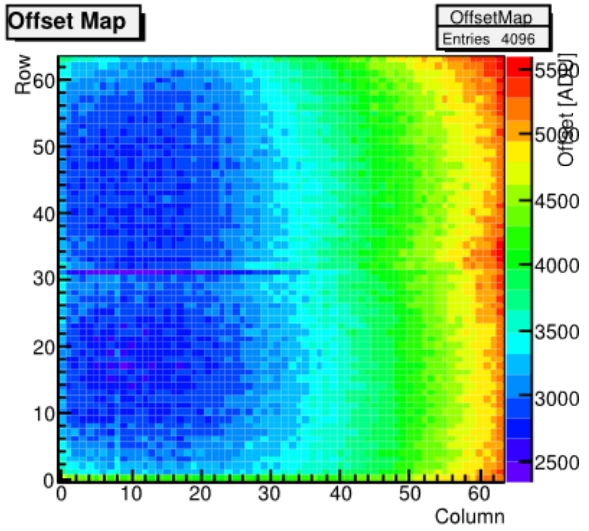
Analysis Examples

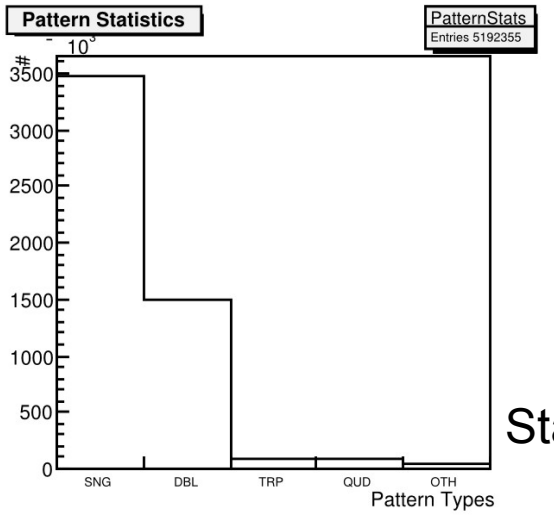
Singles

Detector Energy Resolution

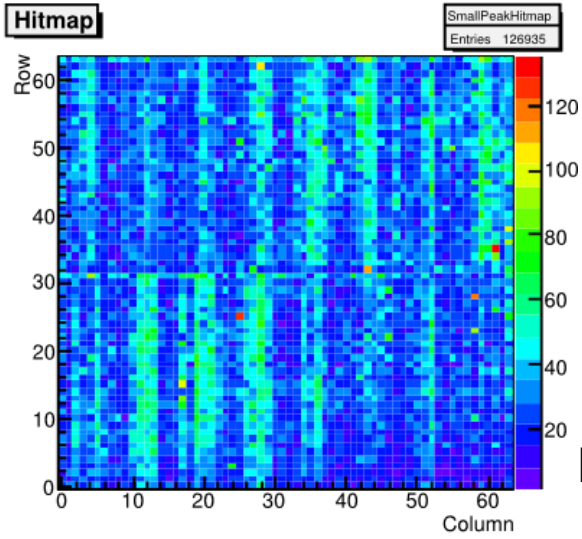


Pixel Offsets





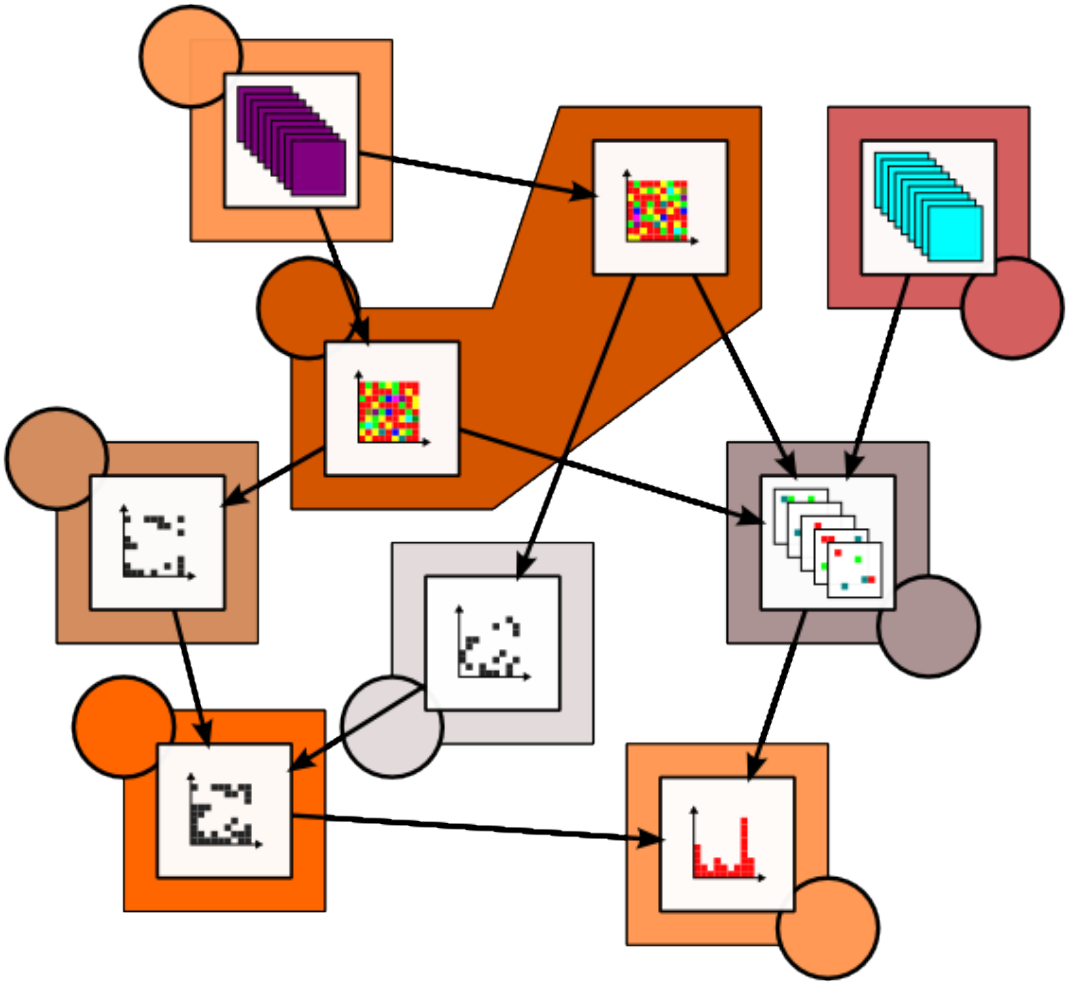
Statistics



Hitmaps

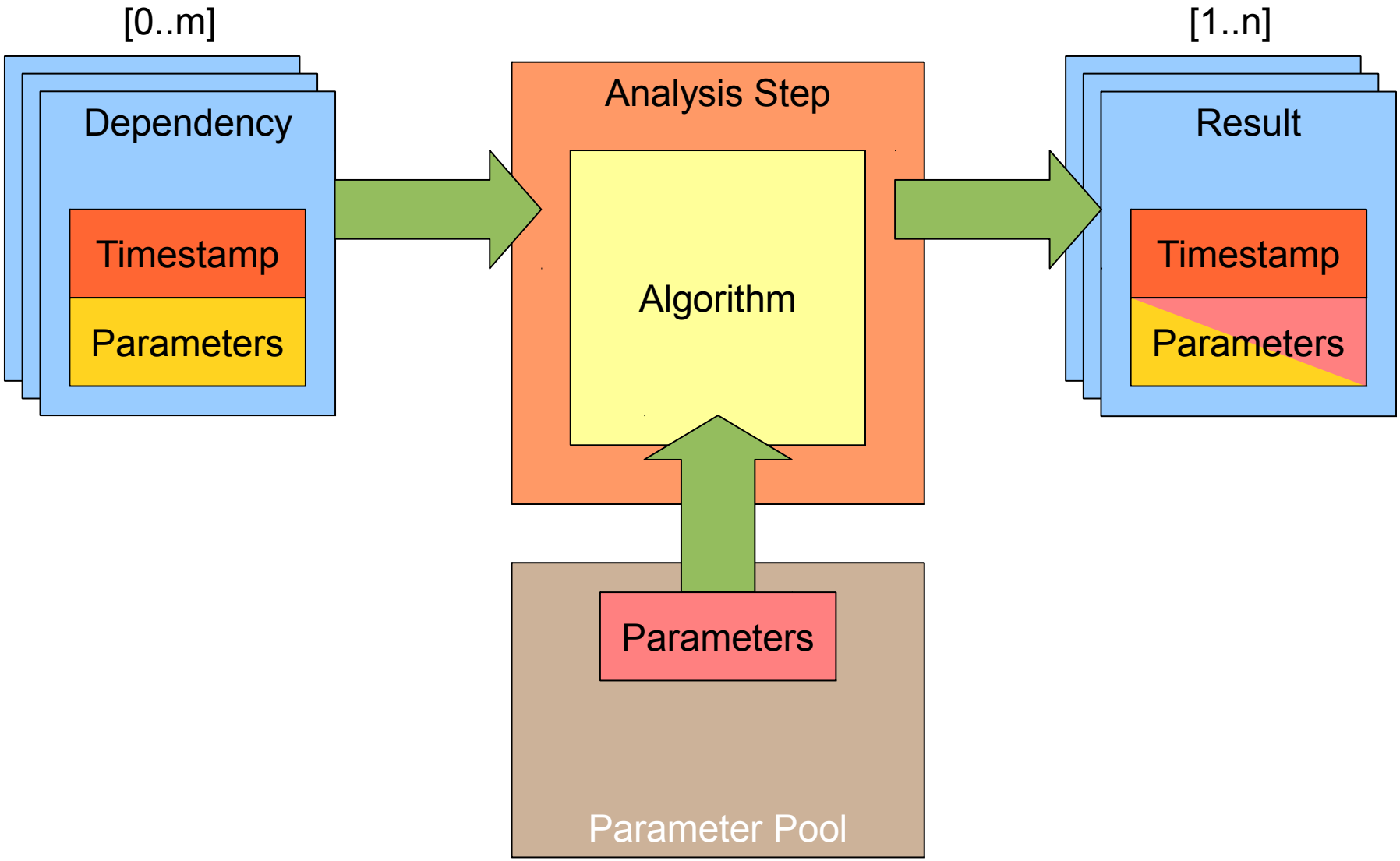
DePFET Detecors

Analysis Situation



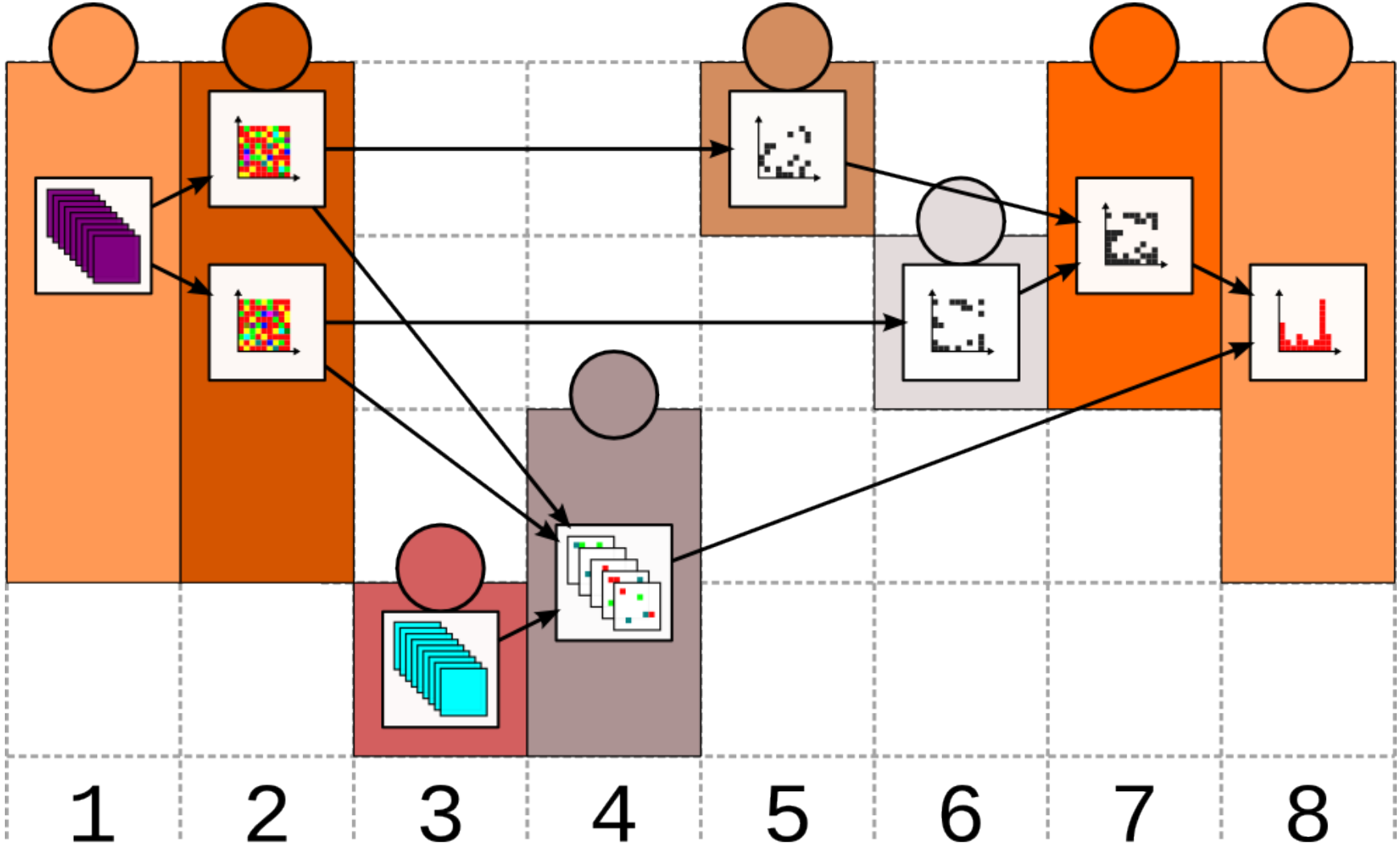
ROOT based Offline Analysis

Analysis Core



ROAn

Dependency Resolution



ROAn

Parameter File Example

```
Analysis.FrameSourceCal.InputFile  <Filename>
Analysis.FrameSourcePhoton.InputFile  <Filename>
Analysis.FilterEvents.ThresPrm  5
Analysis.FilterEvents.ThresSec  3
[...]
```

step parameters

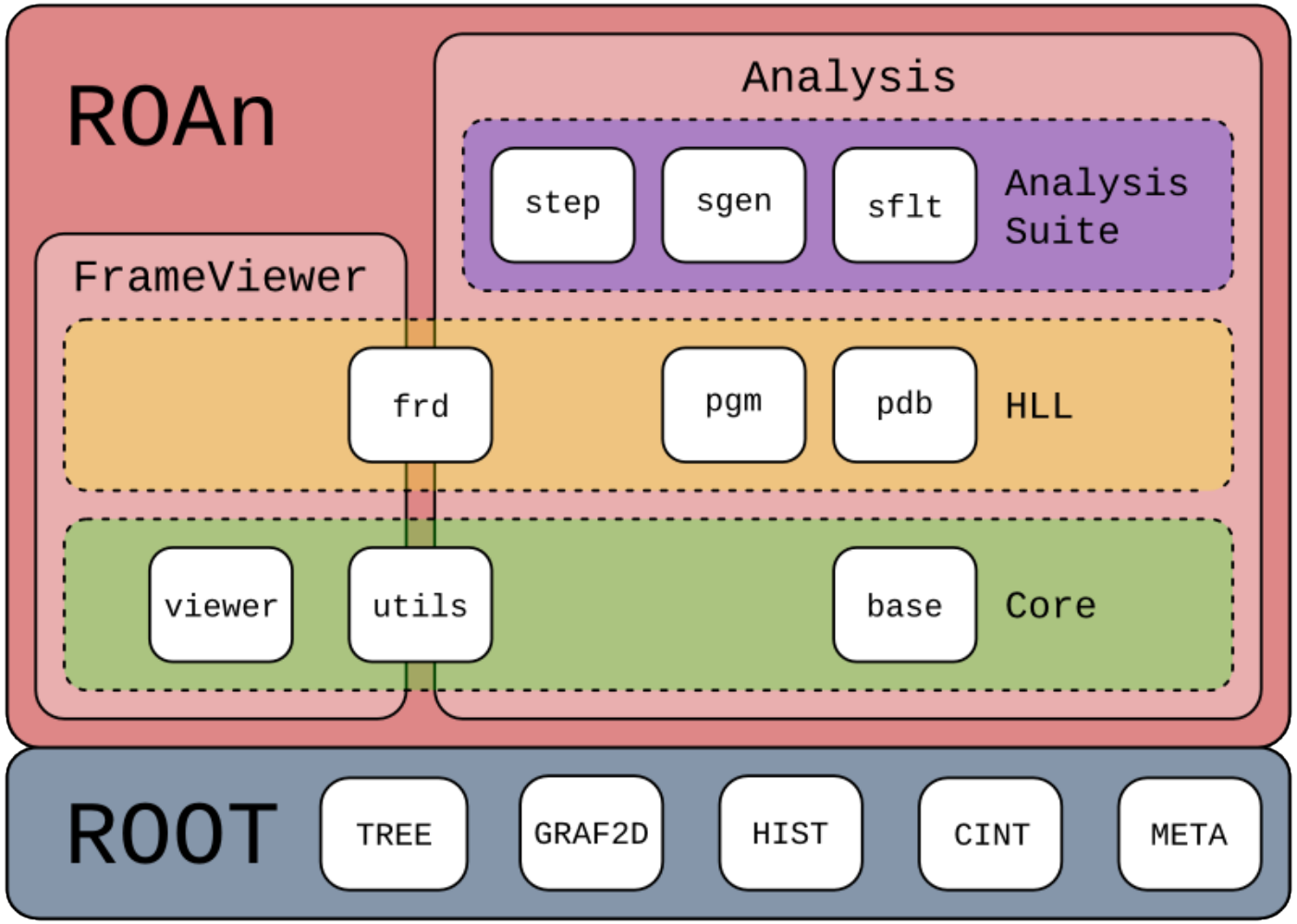
```
Analysis.Steps   FrameSourceCal
+Analysis.Steps  OffNoiMap
+Analysis.Steps  FilterEvents
+Analysis.Steps  GenSpectra
```

analysis agenda

ROAn
Usage example

- `LoadAnalysis( “PrmFile.prm” )`
  - Load parameters
  - Initialize analysis (load steps, build result list)
- `UpdateResult( “Histogram” )`
  - Dependency resolution
  - Up-to-date check
  - Result calculation
- `DisplayResult( “Histogram” )`

ROAn
Architectural Overview



ROAn
Benefits of ROOT

- Meta-Information

```
TClass* Class = TClass::GetClass( “MyClass” );
TMyBase* MyBase = (TMyBase*) Class->New();
MyBase->DoStuff();
```

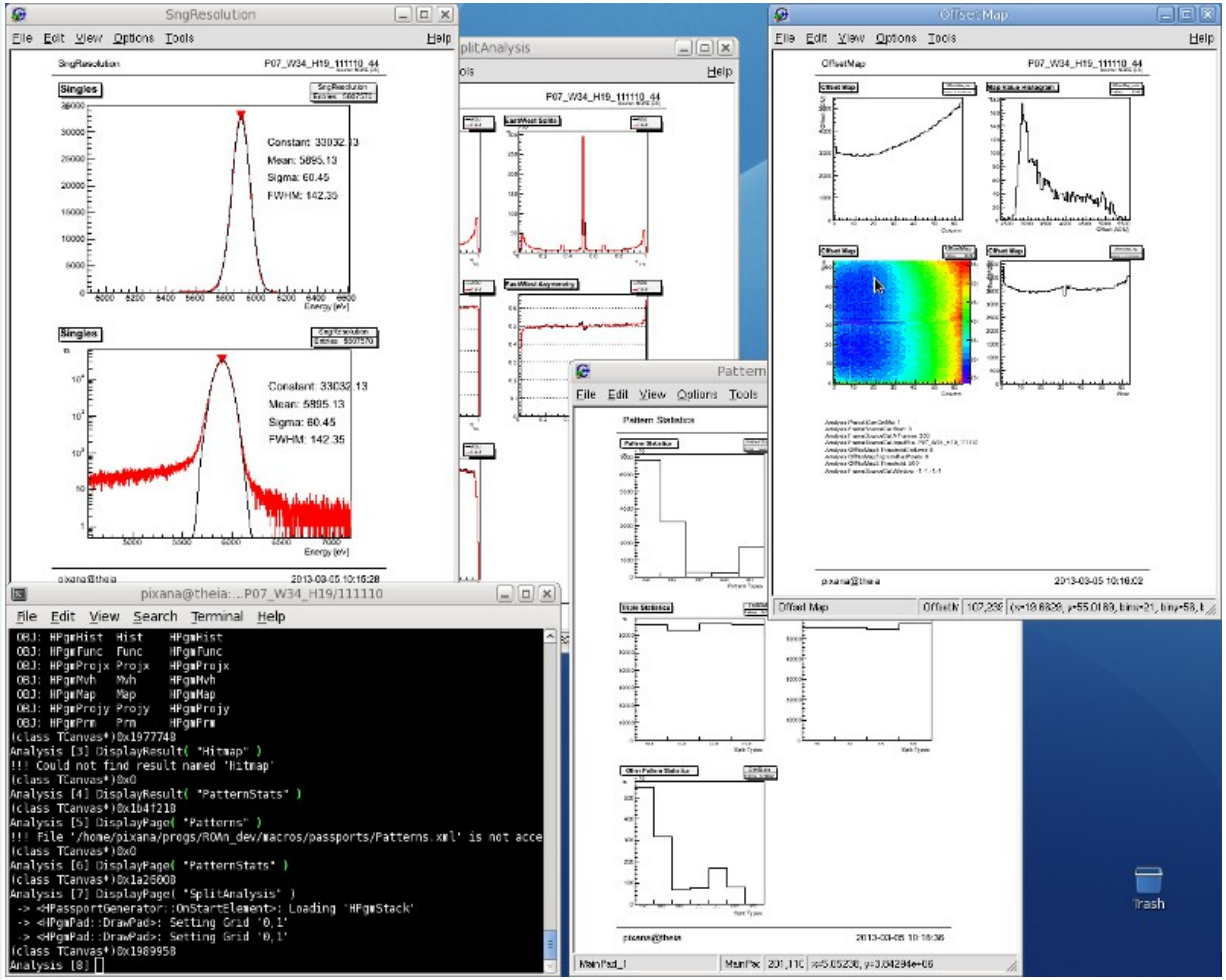
- CINT/ACLiC

  allows fast prototyping of new steps

- TTree data structure for storage of patterns
- And much more...

ROAn

ROOT based Offline Analysis



- Make-like dependency resolution
- Easy to adapt to new tasks/detectors/...
- Scriptable

Conclusion

- Constant development since 2007
- Used in daily analysis and several campaigns
- Simple core, highly configurable

- So far, ROOT has served us well,
  we are expectant for ROOT6!

Thank you for your attention!