

# StEvent and ITTF



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This is not really a talk but a  
bunch of slides for info and  
discussion

# StEvent: Brief Summary

- StEvent contains
  - ◆ 100 classes
  - ◆ 3 structures
  - ◆ 9 (public) enums
  - ◆ ~500 data member
  - ◆ 103 header files
  - ◆ 99 source (.cxx) files
  - ◆ 21k lines
- StEvent uses
  - ◆ StarClassLibrary
  - ◆ ROOT
  - ◆ STL
- Persistence (well say I/O) is accomplished by
  - ◆ Inheriting from StObject (aka TObject)
  - ◆ ClassDef( ) and ClassImp( ) macros
  - ◆ Running it through CINT (cons knows how)
- Only one person has CVS Karma



# How is StEvent build ?

- Instance is created in StEventManager
- ... late in the BFC chain
- In StEventManager
  - ◆ Most classes are build from tables:
    - event\_header
    - dst\_event\_summary
    - dst\_mon\_soft\_ctb
    - dst\_mon\_soft\_emc
    - dst\_mon\_soft\_ftpc
    - dst\_mon\_soft\_glob
    - dst\_mon\_soft\_l3
    - dst\_mon\_soft\_rich
    - dst\_mon\_soft\_svt
    - dst\_mon\_soft\_tpc
    - dst\_TrqDet
    - dst\_L0\_Trigger
    - dst\_L1\_Trigger
    - dst\_globtrk
    - dst\_primtrk
    - dst\_dedx
    - dst\_vertex
    - dst\_v0\_vertex
    - dst\_xi\_vertex
    - dst\_tkf\_vertex
    - dst\_point

# How is StEvent build ? (continued)

- ◆ Most StEvent classes take the related tables as arguments to their constructors.  
(e.g. `StTrack(const dst_track& )`)
- ◆ Indices are replaced by pointers and references
  - Very tricky and non-trivial
  - Lot of work went into debugging this part
- ◆ Some data is taken from StDetectorDbMaker
  - DB RICH Scaler
  - DB Beam Info
- ◆ Some info comes from the Tpc DB
  - TPC drift velocity (StRunInfo)
- The rest is filled outside StEventManager by more modern Makers
  - RICH
  - EMC
  - TOF
  - FPD
  - BBC
- All this is removed with: `delete event ;`
  - ◆ There is no memory leak!



# StEvent Uses Tables

|                             |                              |
|-----------------------------|------------------------------|
| StCalibrationVertex         | St_dst_vertex_Table.h        |
| StCtbSoftwareMonitor        | St_dst_mon_soft_ctb_Table.h  |
| StCtbTriggerDetector        | St_dst_TrgDet_Table.h        |
| StDedxPidTraits             | St_dst_dedx_Table.h          |
| StEmcSoftwareMonitor        | St_dst_mon_soft_emc_Table.h  |
| StEmcTriggerDetector        | St_dst_TrgDet_Table.h        |
| StEventInfo                 | St_event_header_Table.h      |
| StEventSummary              | St_dst_event_summary_Table.h |
| StFtpcHit                   | St_dst_point_Table.h         |
| StFtpcSoftwareMonitor       | St_dst_mon_soft_ftpc_Table.h |
| StGlobalSoftwareMonitor     | St_dst_mon_soft_glob_Table.h |
| StGlobalTrack               | St_dst_track_Table.h         |
| StHelixModel                | St_dst_track_Table.h         |
| StKinkVertex                | St_dst_tkf_vertex_Table.h    |
| StL0Trigger                 | St_dst_L0_Trigger_Table.h    |
| StL0Trigger                 | St_dst_TrgDet_Table.h        |
| StL1Trigger                 | St_dst_L0_Trigger_Table.h    |
| StL1Trigger                 | St_dst_L1_Trigger_Table.h    |
| StL3SoftwareMonitor         | St_dst_mon_soft_l3_Table.h   |
| StMwcTriggerDetector        | St_dst_TrgDet_Table.h        |
| StPrimaryTrack              | St_dst_track_Table.h         |
| StPrimaryVertex             | St_dst_vertex_Table.h        |
| StRichHit                   | St_dst_point_Table.h         |
| StRichSoftwareMonitor       | St_dst_mon_soft_rich_Table.h |
| StSoftwareMonitor           | St_dst_mon_soft_ctb_Table.h  |
| StSoftwareMonitor           | St_dst_mon_soft_emc_Table.h  |
| StSoftwareMonitor           | St_dst_mon_soft_ftpc_Table.h |
| StSoftwareMonitor           | St_dst_mon_soft_glob_Table.h |
| StSoftwareMonitor           | St_dst_mon_soft_l3_Table.h   |
| StSoftwareMonitor           | St_dst_mon_soft_rich_Table.h |
| StSoftwareMonitor           | St_dst_mon_soft_svt_Table.h  |
| StSoftwareMonitor           | St_dst_mon_soft_tpc_Table.h  |
| StSsdHit                    | St_dst_point_Table.h         |
| StSvtHit                    | St_dst_point_Table.h         |
| StSvtSoftwareMonitor        | St_dst_mon_soft_svt_Table.h  |
| StTpcHit                    | St_dst_point_Table.h         |
| StTpcSoftwareMonitor        | St_dst_mon_soft_tpc_Table.h  |
| StTptTrack                  | St_dst_track_Table.h         |
| StTrack                     | St_dst_track_Table.h         |
| StTrackDetectorInfo         | St_dst_track_Table.h         |
| StTrackFitTraits            | St_dst_track_Table.h         |
| StTrackGeometry             | St_dst_track_Table.h         |
| StTrackPidTraits            | St_dst_dedx_Table.h          |
| StTriggerDetectorCollection | St_dst_TrgDet_Table.h        |
| StV0Vertex                  | St_dst_v0_vertex_Table.h     |
| StV0Vertex                  | St_dst_vertex_Table.h        |
| StVertex                    | St_dst_vertex_Table.h        |
| StVpdTriggerDetector        | St_dst_TrgDet_Table.h        |
| StXiVertex                  | St_dst_vertex_Table.h        |
| StXiVertex                  | St_dst_xi_vertex_Table.h     |
| StZdcTriggerDetector        | St_dst_TrgDet_Table.h        |



# StEvent Uses Tables (continued)

The following 40 classes are affected:

StCalibrationVertex  
StCtbSoftwareMonitor  
StCtbTriggerDetector  
StDedxPidTraits  
StEmcSoftwareMonitor  
StEmcTriggerDetector  
StEventInfo  
StEventSummary  
StFtpcHit  
StFtpcSoftwareMonitor  
StGlobalSoftwareMonitor  
StGlobalTrack  
StHelixModel  
StKinkVertex  
StL0Trigger  
StL1Trigger  
StL3SoftwareMonitor  
StMwcTriggerDetector  
StPrimaryTrack  
StPrimaryVertex  
StRichHit  
StRichSoftwareMonitor  
StSoftwareMonitor  
StSsdHit  
StSvtHit  
StSvtSoftwareMonitor  
StTpcHit  
StTpcSoftwareMonitor  
StTptTrack  
StTrack  
StTrackDetectorInfo  
StTrackFitTraits  
StTrackGeometry  
StTrackPidTraits  
StTriggerDetectorCollection  
StV0Vertex  
StVertex  
StVpdTriggerDetector  
StXiVertex  
StZdcTriggerDetector



# And now ITTF comes ...

## Influence on StEvent:

- Tables will disappear
- Possibly new variables come in
- Old become obsolete
- Structural changes?

## Requirements and Constraints:

- ◆ **Keep backwards compatibility**
  - Read old event.root files (data member)
  - Keep functionality (member functions)

Luckily we have *schema evolution* and *private* data member.

To some extent this is also a chance to **clean up**

# How to achieve all that?

In small steps: here a proposal

1. Split `StEventManager` into
  1. `StEventManager` (create instance only)
  2. `StEventFiller` (fills from tables and DB)
2. Remove classes not really needed any more
  1. `StSoftwareMonitor`
  2. `StEventSummary`
  3. more ...
3. Create/modify cluster finder to fill hits directly into `StEvent`
  1. SVT (?)
  2. TPC (F77 code)
  3. SSD (Christoph is already getting ready)
  4. FTPC (?)
  - ◆ This is when everything gets screwed up
4. Plug in ITTF modify classes (if necessary)
5. Let ITTF fill tracks into `StEvent`
6. At this point the following tables might go
  1. `dst_track`
  2. `dst_point`





# How to achieve all that? (continued)

## 7. Lots of stuff still broken

1. V0s, kinks, ...
2. Vertex finder
3.  $dE/dx$

## 8. Fix stuff downstream from ITTF

1. New or rewritten old vertex finder
2. Modify V0 and kink finder
3. Modify dedx maker
4. Now `dst_dedx`, `dst_vertex`, `dst_v0_vertex`, and `dst_xi_vertex` can go

## 9. Start extensive tests of ITTF in chain

## 10. In parallel remove tables upstream (f77 to C++)

1. Fill trigger data directly into StEvent so `dst_TriggerDet`, `dst_L0_Trigger`, `dst_L1_Trigger` can go
2. Fill StEventInfo

## 11. Done

During all this we need extensive QA to check if all members are filled and backwards compatibility is maintained. StEventFiller needs to be updated as we go along.



# Summary

StEvent survived ROOT it will survive ITTF as well

- Probably will become more consistent and compact

My wish list for the ITTF integration:

- Have this effort coordinated by *one* person
- Let's have a plan we all agree on and stick to
- Let's have regular meetings

Also on my wish list

- An extended documentation of StEvent
  - Merge Oxygen + StEvent.tex
- Find someone to learn the guts of StEvent

My biggest worry:

- Backwards compatibility
- Not finding the experts to work on legacy code
  - F77 to C++
  - Tables to StEvent

