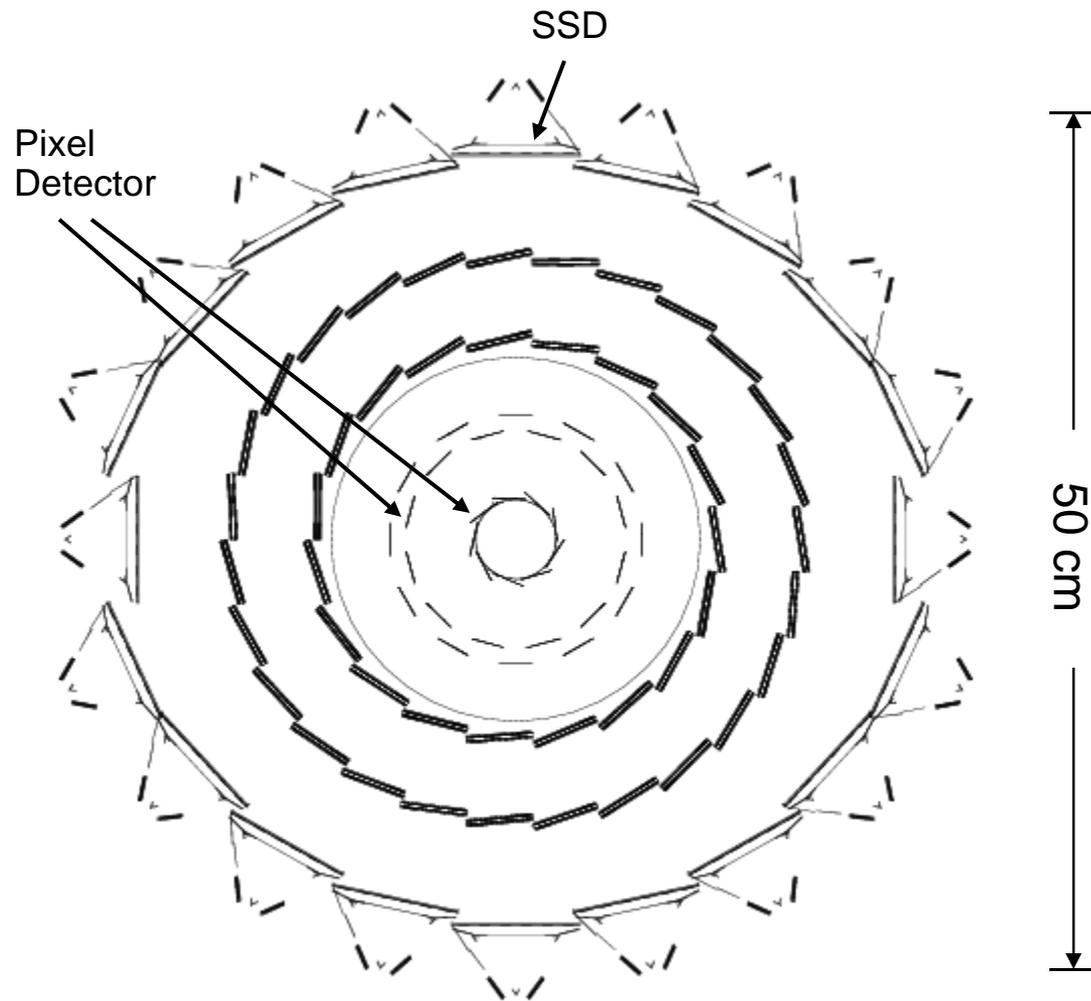


SSD News and Integration Notes

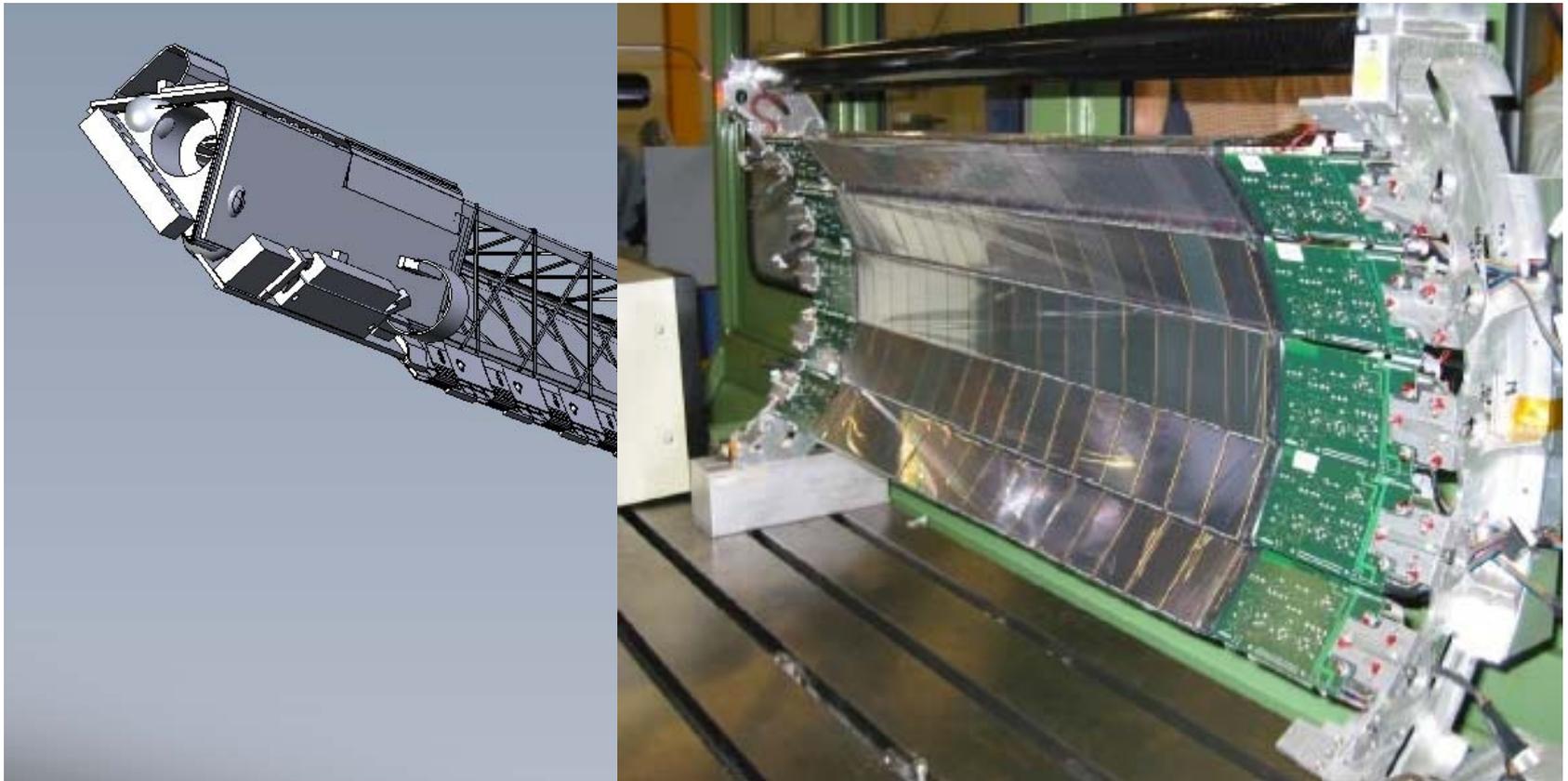
Jim Thomas
Lawrence Berkeley National Laboratory

September 11th, 2007

The SSD – 20 ladders of double Sided Si



The SSD is a beautiful detector that is in the right place at the right time

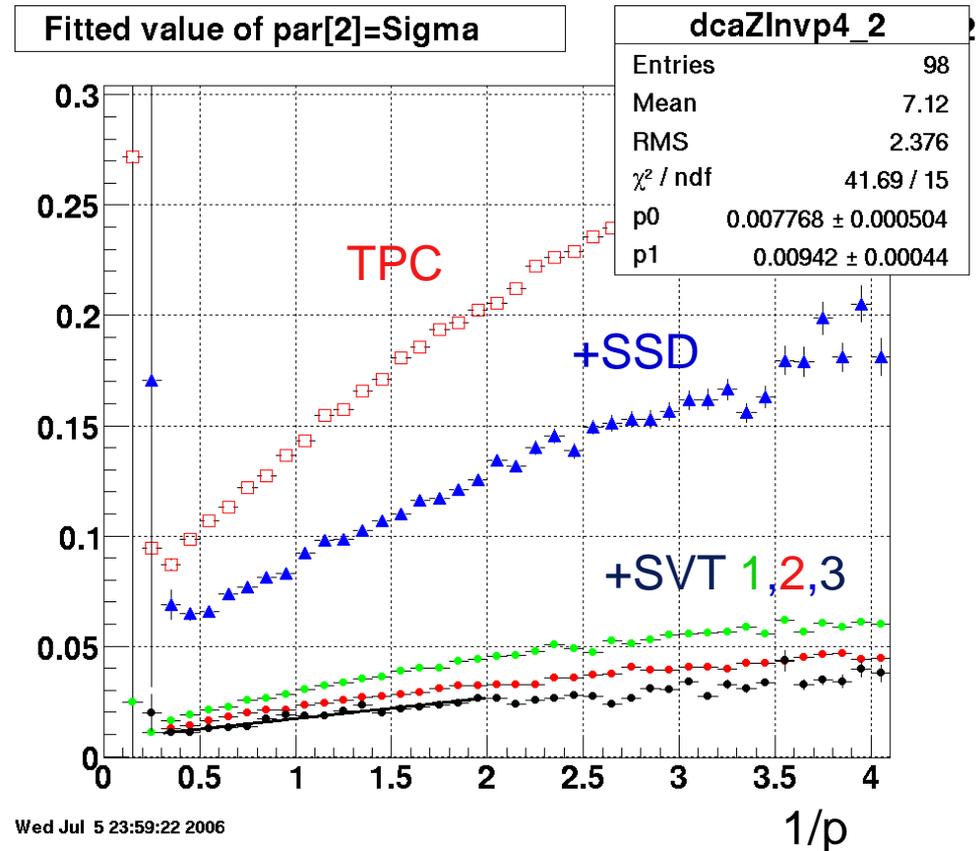


- **Double sided 4.2 cm crossed strips, automatically resolves ambiguities**
- **Si chips on the bottom of the truss**
- **Electronics on each end (bi-directional readout)**
- **Air cooling required, enters on one side, leaves on the other**

The Good News



- It works
- Spiro's results for Cu-Cu
- Emphasis on SVT
- Presented at LHC tracking workshop



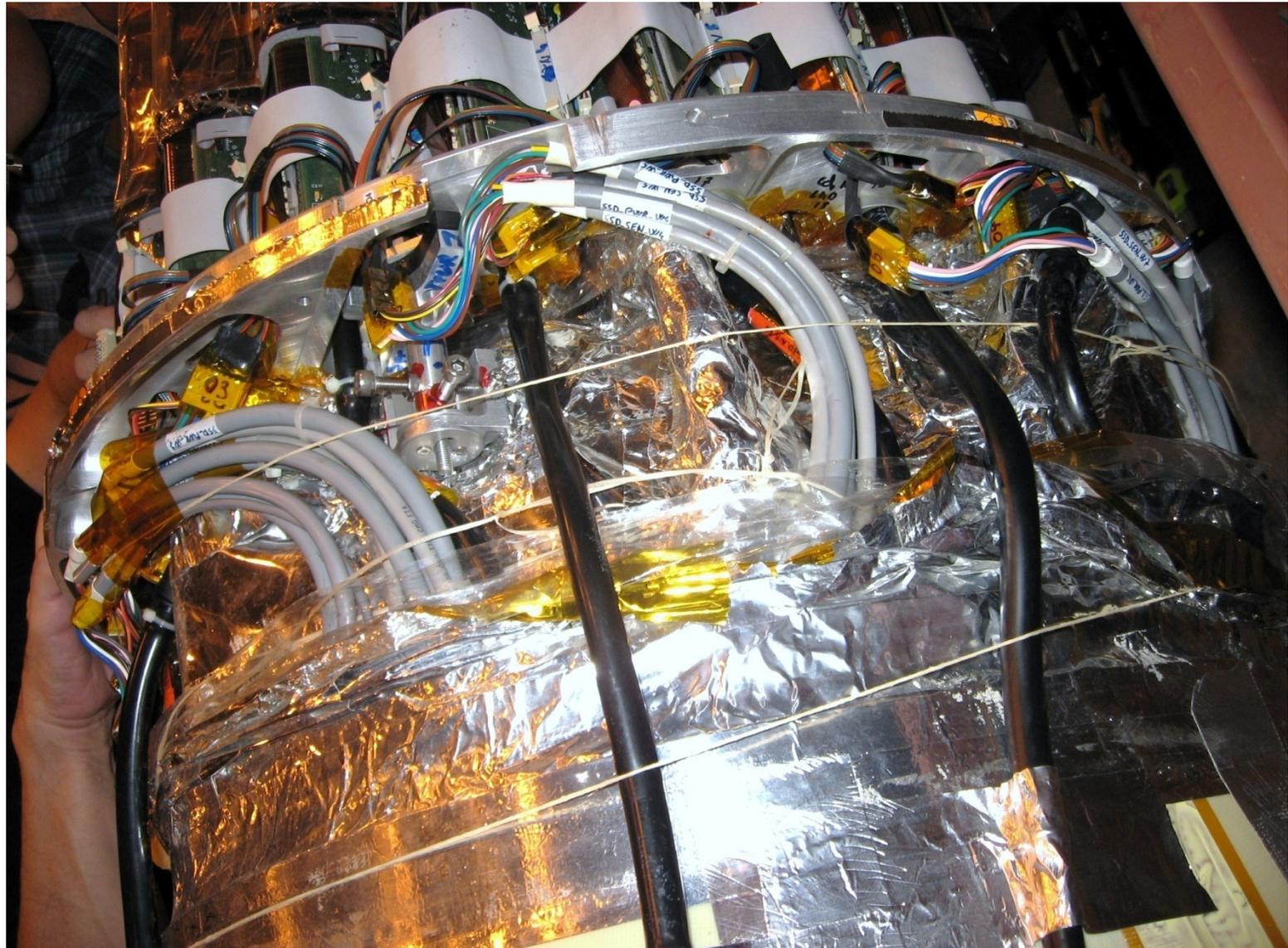
- **Resolution here includes vertex and hit resolutions. Real values 20% smaller**
- At infinite momentum limit is $\sim 150\mu\text{m}$ in XY and $80\mu\text{m}$ in Z ($\sim \text{vtx}$ resolution in CuCu)
- At 1 GeV/c it is $220\mu\text{m}$ in XY and 150 in Z
- Z is our good (not drifting) coordinate!

The Good News is that the SSD did work (for one run)



- **The bad news is that it didn't work perfectly the 2nd time we tried to run it**
- **Approximately 10 ladders worked well**
- **Approximately 10 ladders were dead or noisy**
 - Two ladders had short term intermittent problems
 - Two were dead due to hardware failures
 - The remainder ran hot, and were kept in the run by scaling back on the number of Si modules powered up on each ladder
- **We believe that overheating was the cause of the problems**
 - Cooling system is based on pulling air through the detector with a vortex vacuum system
 - Hypothesis: kinked hoses
 - System can easily be redesigned to use forced air
 - New system needs rigid hoses and more attention to installation procedure to avoid kinks and/or reduced air flow

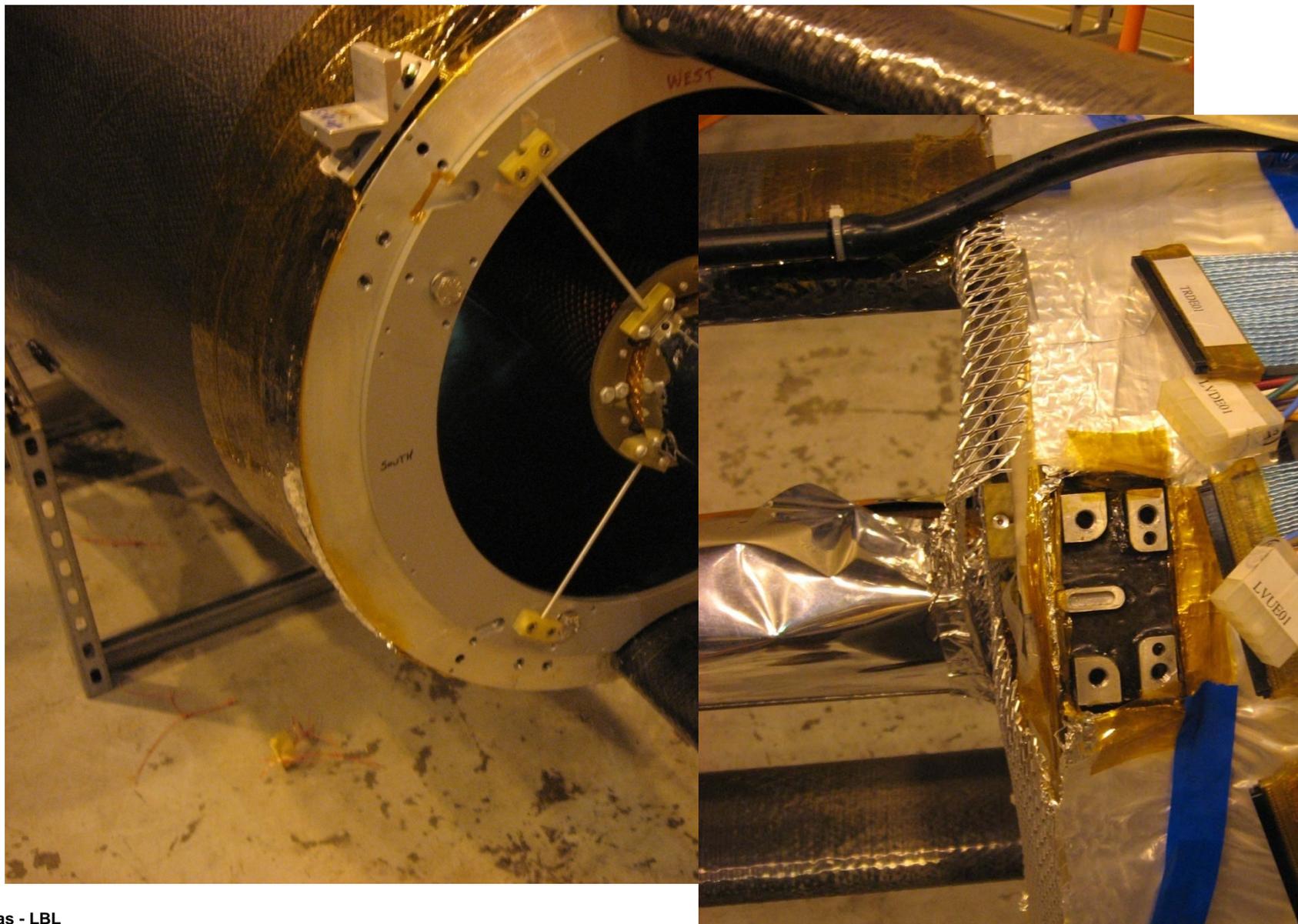
Cooling and Power Connections



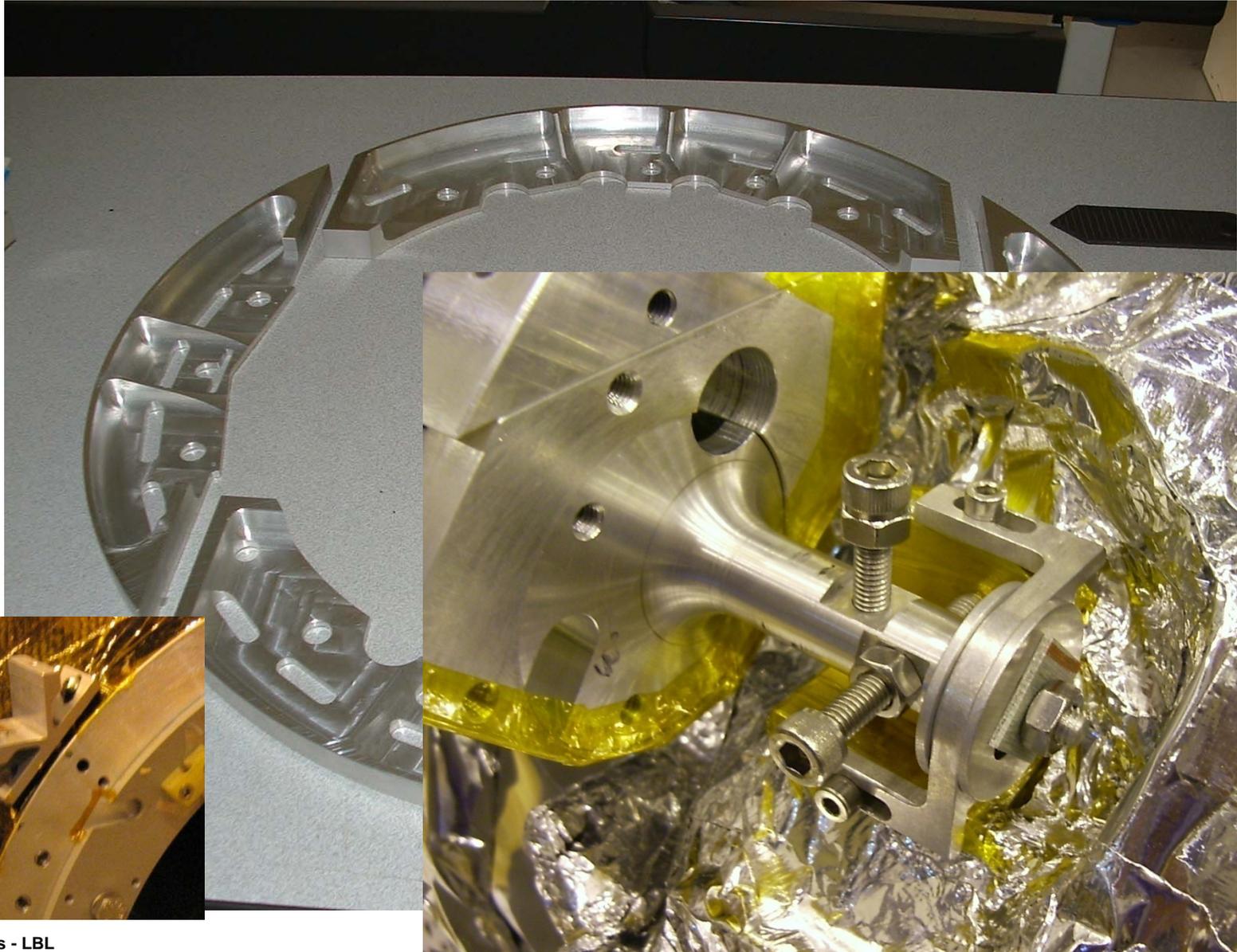
The outer wrap of SSD Cables (one of four)



SSD Mounting Detail (one of four per side)



Ladder to Cone mounting detail



Key Active People this year



- **France**

- **Christophe Renard**
- **Stephane Bouvier**
- **Gerard Guilloux**
- **Jonathan Bouchet**
- **Artemious Geromitsos**
- **Jerome Baudot**
- **David Bonnet**

- **US**

- **Michael LeVine**
- **Jim Thomas**
- **Vi Nham Tran**
- **Howard Matis**

SSD Timetable



Run	Date	Ion	SSD state	Pixel Prototype	DAQ 1000
8	Nov. 2007	d + Au p + p	Out	Out	No
9	Nov. 2008	Au + Au p + p Low Mass Run	Scenario I	Out	No
10	Nov. 2009	Low Energy Au + Au p + p	Scenario II	In	Yes

- **QA, filtering, calibration**
- **Repair and maintenance**
- **Upgrade cooling**
- **L2**
- **Readout upgrade**
- **Slow controls**
- **Runtime operations**
- **Reinstallation**
- **QA monitoring**

- **Several ladders are broken**
- **Ladders need to be checked and broken ones repaired**
- **Repairs must be done at Nantes**
- **People**
 - **Stephane**
 - **Help from Michael, Jim, and Howard**
- **To do**
 - **Create a test bench at BNL for inspection**
 - **Need BNL tech - 20% FTE to learn system, diagnose and repair**
 - **Assemble parts inventory**

- **Scenario I – October 1**
 - 1/4 FTE designer for new cooling system
 - Transfer SVT slow controls system to SSD
 - **Slow control group**
 - Install cooling interlocks

- **Scenario 2 - Next year**
 - Cooling done as part of HFT installation
 - Need to relate slow control interface to SSD interlocks

- **Upgrade electronics Design of new readout**
 - Must be sensitive to DAQ1000
 - STAR needs to define triggering requirements
- **Personal for upgrade**
 - Christophe (Nantes) 0.75 FTE-yr
 - Michael 0.5 FTE-yr
 - Digital electronics engineer (BNL - TBD) 0.75 FTE-yr
- **Software to decode new data format**
 - Michael 0.1 FTE-yr
- **Cost**
 - \$350 K (?)

Scenario 1 or 2, when to re-install the SSD?



- **The SSD improves the pointing at the vertex**
 - Distinguish background for non-photonic electrons
 - Enhance strange particle yields
- **It is a thin detector**
- **Need analysis by working groups of pros and cons of having it in ... a difficult analysis**
 - Background from photon conversions may be the Achilles heel
- **SSD is used to calibrate the TPC**
- **The longer the SSD out, the more institutional memory lost**
 - We need the experience running the detector because we have not guarantee that it will work

A \$16 M upgrade depends on this detector

- **This year we assembled a good team**
 - Strong support from the French
 - Need to transfer center of gravity of support to North America
 - significant training & re-training required
- **Electrical and Mechanical interface to Cone is well defined**
- **Cooling system upgrade is required**
- **Electronics Upgrade in being planned**
 - Need money, engineering and tech support
- **STAR management will work to establish when the SSD should be reinstalled**
 - Helen Caines has already established a committee and is working on the charge to that committee