FTPC software

All code is written in C++ and is framed within the ROOT infrastructure, with the exception of the pad monitor, a stand–alone package written in JAVA and C++.

Software coordinator: J. Seyboth

- Pad monitor (J. Klay, UC Davis);
- Point reconstruction (H. Huemmler, MPI);
- Tracker (M. Oldenburg, MPI);
- V0 finder (M. Heffner, UC Davis).

Expect to see tracks at the first collisions.

FTPC point reconstruction

H. Huemmler

The challenge of the point reconstruction task is to find, deconvolute and fit up to 10,000 clusters per event and to do it fast.

The raw data are zero suppressed, and the cluster finder has to further reject noise above threshold and identify clusters keeping to a minimum the access to large data structures.

Cluster deconvolution and fitting is done by recursive one dimensional gasussian fitting.

The transformation pad/time bin to cartesian coordinates is performed through lookup tables generated by the MAGBOLTZ code, which calculates drift parameters of electrons in gas in an electric and magnetic field.

The time needed by this package to process a typical event is **5s** (on a 400MHz Intel processor).

FTPC tracker

M. Oldenburg

The tracker package has to find and fit up to 1000 tracks per event in a very high track density environment.

In order to optimize CPU usage the points are sorted into bins defined by the azimuthal and polar angle and the pad row.

A conformal map transformation is then applied. In this new space circles can be fitted using fast linear regressions.

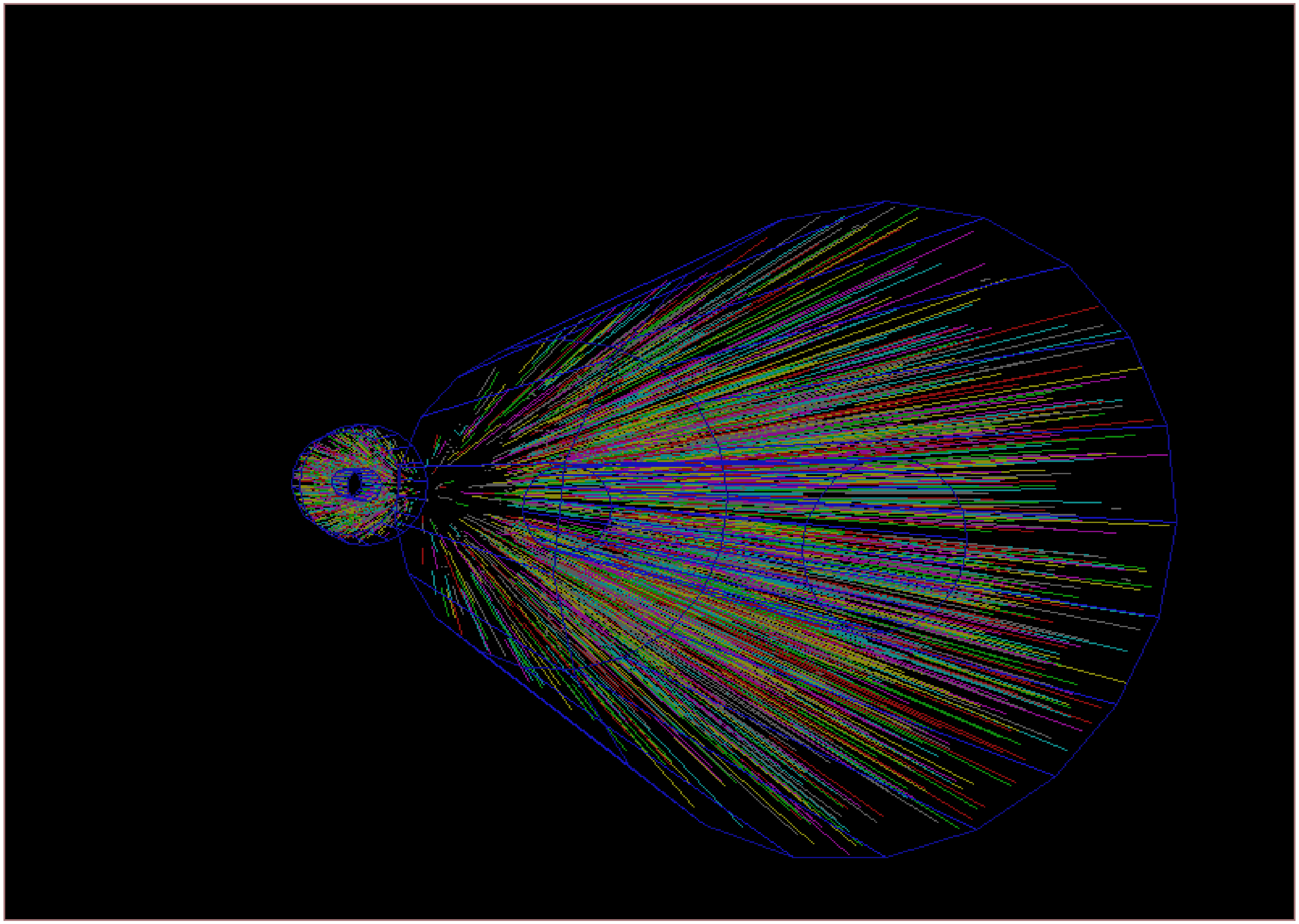
A first guess of the particle's momentum is made assuming a uniform field, a refit using the measured field values gives the final momentum.

The entire package takes up to 20s per event for the most populated events.

The tracking efficiency is about 70% and is fairly flat as a function of η and P_T (for 10 points tracks).

FTPC track display

M. Oldenburg



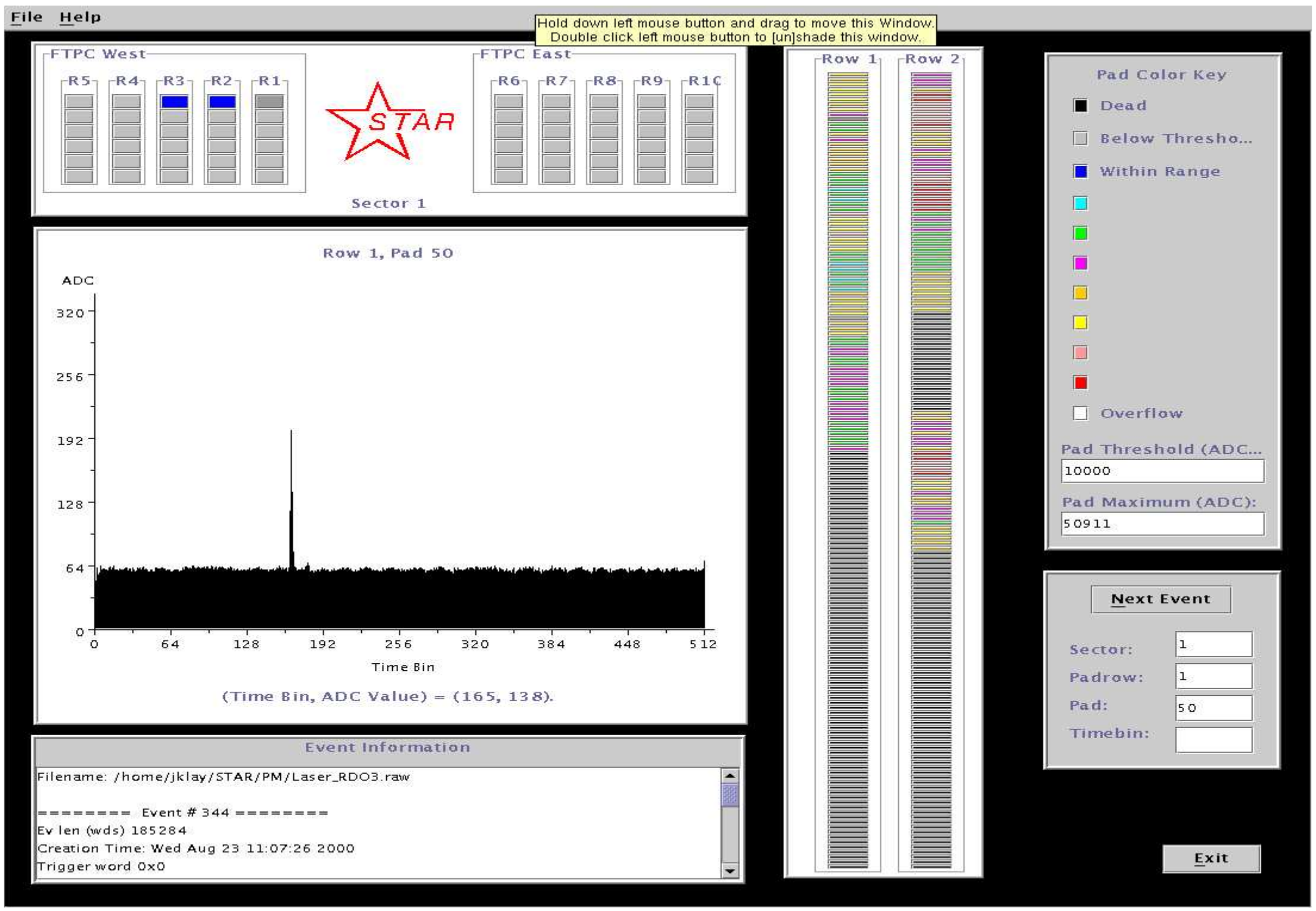
FTPC pad monitor

J. Klay

This stand–alone code consists of two parts:

the GUI which is written in JAVA and

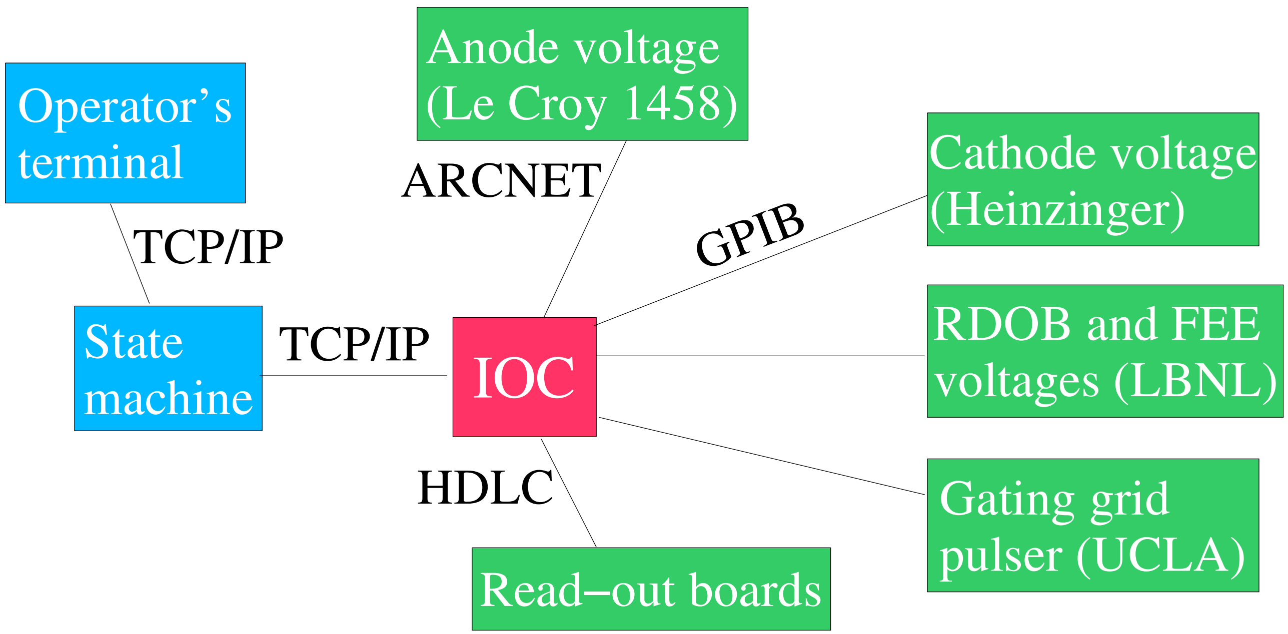
the I/O interface that is written in C++.



FTPC controls and interlocks

G. Lo Curto

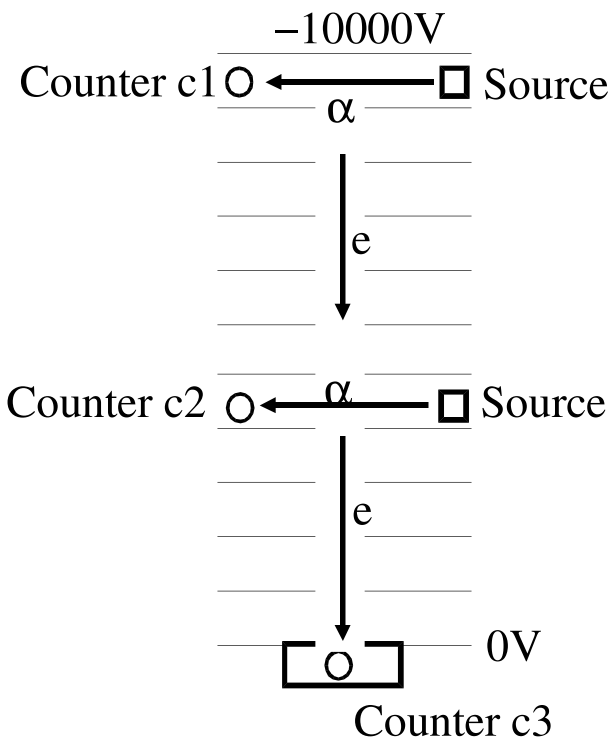
The control system has been developed within the EPICS infrastructure and uses TCP/IP, ARCNET, GPIB and HDLC as its communication protocols.



The interlock system, which insures the safety of the detector, is being developed and will connect the cooling and the gas systems to other detector's subsystems.

Drift velocity monitors

Drift velocity monitors are needed in order to observe and record variations of the drift properties of the gas, induced by changes in pressure or temperature.



Drift velocity is calculated as:

$v_{drift}=(y(c1)-y(c2))/(t_{13}-t_{23})$

Signals will be amplified and shaped by ALEPH electronics and read out and stored by a PC running LABVIEW.

The drift velocity resolution of the device will be of the order of 0.1%.

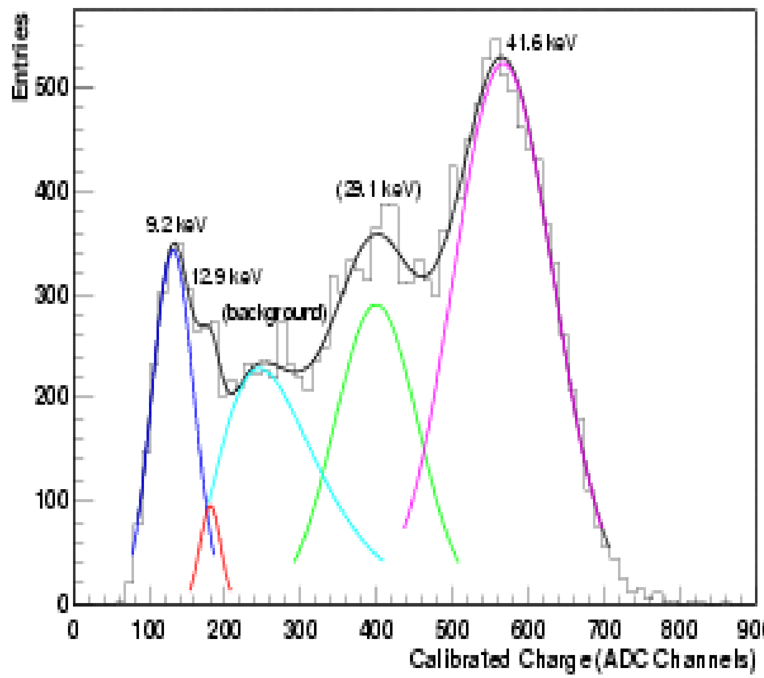
The device is currently under design.

FTPC calibration studies

T. Eggert

The feasibility of energy calibrations using a radioactive source has been tested. These calibrations are essential to optimize the measuring accuracy of the detector.

The sources used are the excited states of the gas $^{83}_{36}$Kr, generated by the weak decay (by electron capture) of $^{83}_{36}$Rb.



The energy measurement accuracy after the calibration is of the order of 2%.

These results are currently being submitted for publication to NIM.

FTPC schedule

- First chamber installed on 26/10/2000 for system test;
- Second chamber will be installed on 30/11/2000 for system test;
- Definitive installation 23/1/2001.
- Drift monitors installation february 2001

Beginning of the next run at RHIC: 1/4/2001.

FTPC man–power

Collaborating institutions:

BNL, LBNL, MPI,
MEPhI, UC Davis, UCLA

MPI is responsible for hardware, software and operation

(year 2000)

Physicists:	V. Eckardt	100%	
	G. Lo Curto	100%	Postdoc
	N. Schmitz		
	A. Schuettauf	100%	Postdoc
	P. Seyboth	10%	
PhD students:	H. Huemmler	100%	Graduated
	M. Oldenburg	100%	
Dipl. Students:	T. Eggert	75%	Graduated
	T. Morgan	50%	
Technicians & programmers	H. Fessler	50%	
	B. Leutpold	20%	
	J. Seyboth	90%	
	M. Vidal	50%	
	T. Titz	30%	Summer st.

Budget profile

	2000	2001	2002	2003
INV/OP	275k	160k	150k	120k
Travel	70k	110k	130k	130k

Requests to Technical Divisions:

- update and complete drawing set;
- design and construction of 5 drift velocity monitors;
- small "leftover" additions (cable supports, spare parts, ...)