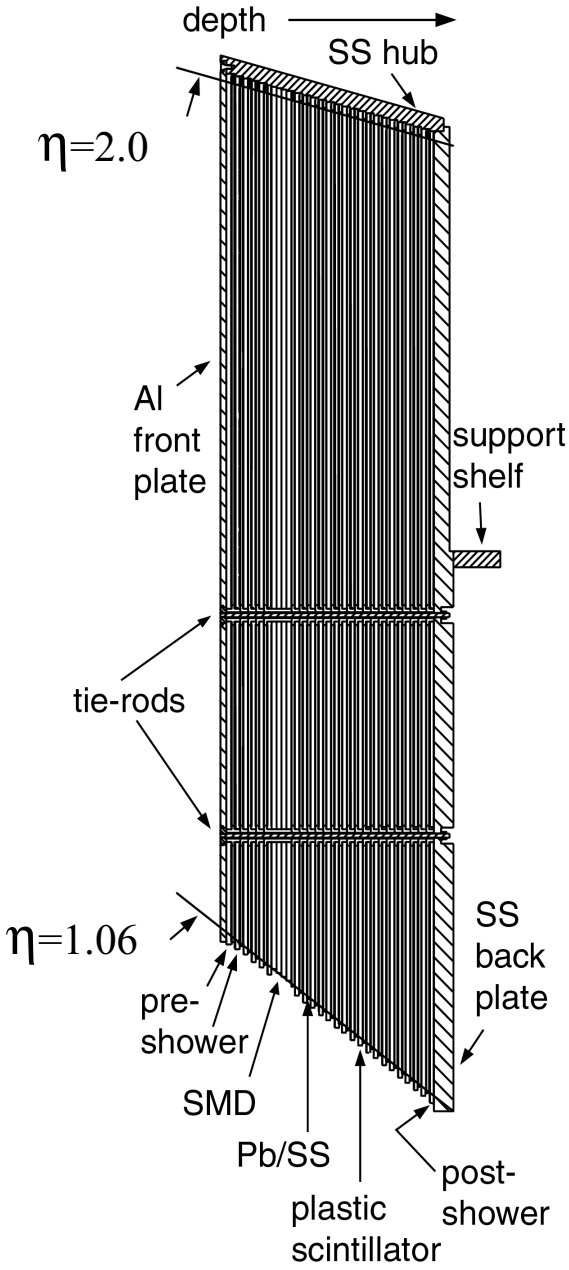
E-EMC developments and plan

Detector status
Run 3 goals
Calibration
Software status

Jan Balewski
IUCF, Indiana

STAR Analysis Meeting
BNL, October 22-24

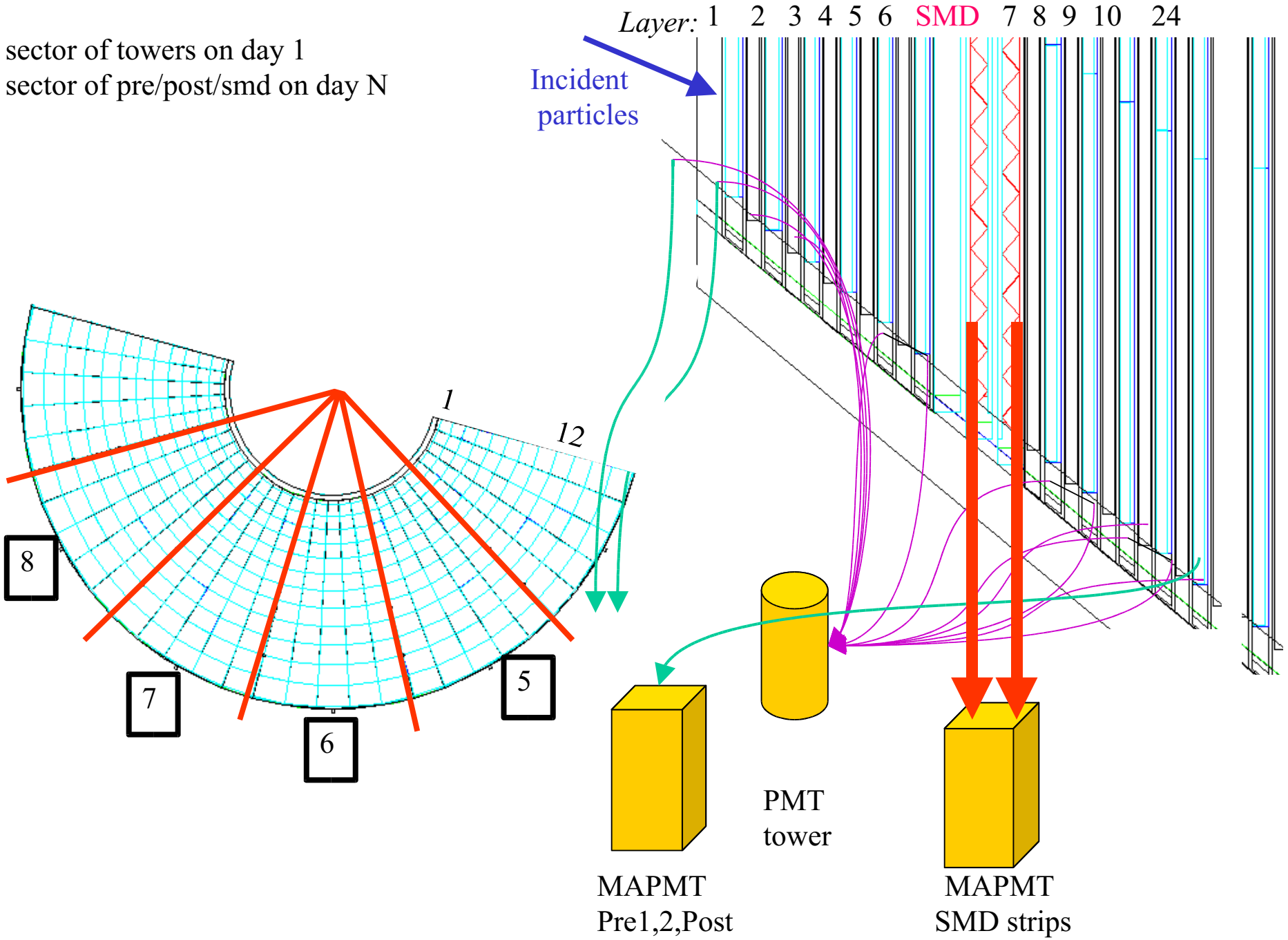
EEMC half is on the STAR poletip



http://www.iucf.indiana.edu/STAR/eemc_proj

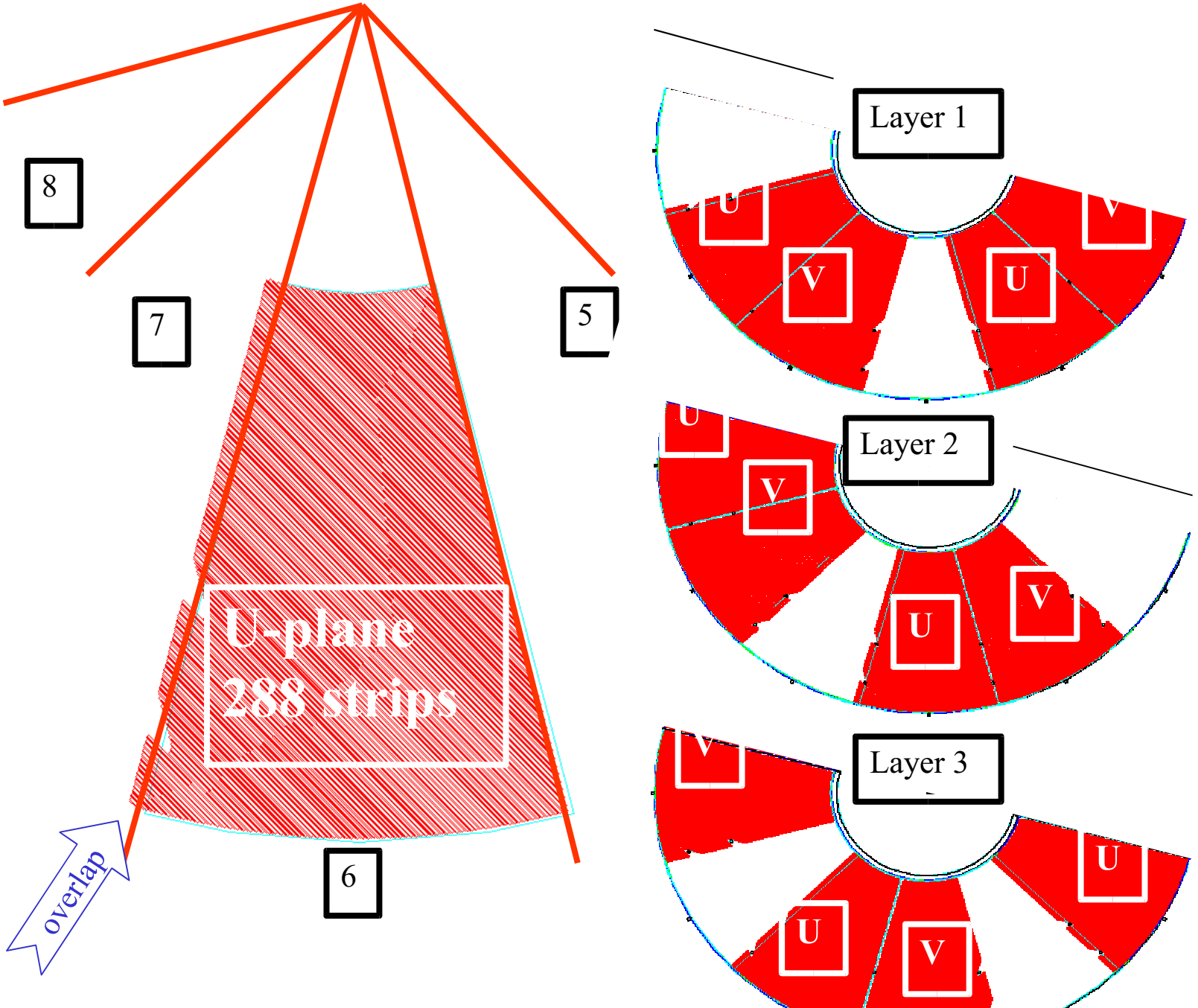
EEMC Instrumentation in Run 3

4 sector of towers on day 1
1 sector of pre/post/smd on day N



SMD layout for EEMC

Designed for π^0/γ identification



Goals for FY03 $\vec{p}$-$\vec{p}$ Run

- Extend search for transverse spin asymmetries at both high and mid-η, with much improved statistical precision ($\times 40$ in $P^2\mathcal{L}$)

- Begin measurements of A_{LL} for inclusive jet production $\Rightarrow$ first hint of ΔG

- Investigate spin sensitivity of $\mathcal{L}$ monitor for A_{LL}

- Commission spin rotators (need monitor process with $A_{LL} \neq 0$ and significant rate)

- Commission EEMC

Talk (Vigdor) at Trigger workshop 5/02 LBNL

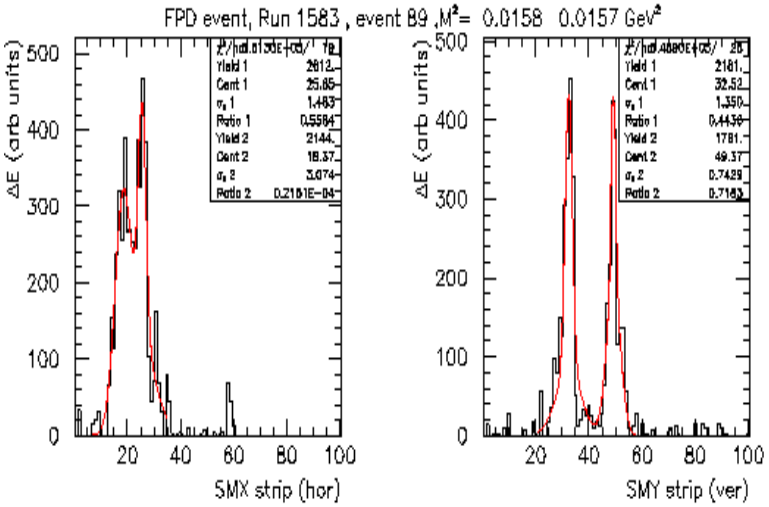
http://www.iucf.indiana.edu/U/STAR/eemc_proj/electr_trig_daq/pp_trigger_2003.ppt

Jet Triggering in STAR

Anticipated jet yield for 3 pb^{-1}, for

EMC jet patch trigger: $\sum E_T > 6$ GeV

over $\Delta\eta = 1.0 \times \Delta\phi = 1.0$ patch

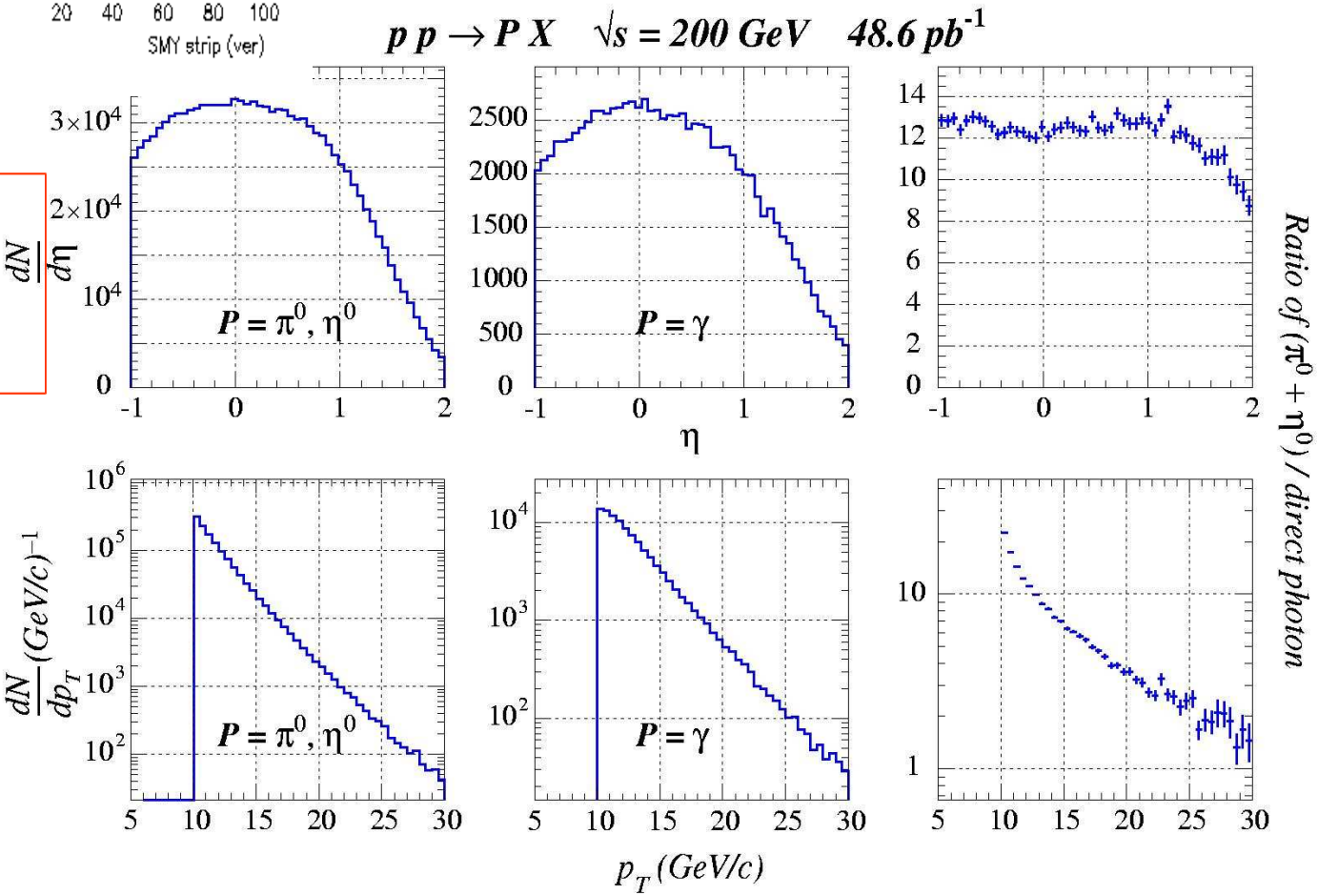


Inclusive π^0 near mid-rapidity

with EMC high-tower trigger

SMD response to π^0
real FPD events,
G.Raknees

M-C
10-day FY03



EEMC in Run 3

Run time calibrations (10% gain matching)

cosmic ray and source scan @ IUCF

- ratio source/MIP response known for 60 towers (done)

rescan with source 4 sectors at WAH with new PMTs (planned)

set HV to E_T=60 GeV for all 4*60 PMTs (planned)

Final calibrations

Towers in 4 sectors: (goal is 2%)

PIM @ 0.3 GeV (absolute)

pi0 in separated towers ~few GeV (absolute)

ρ+ up to ~10 GeV (absolute)

laser 0-150 GeV (relative)

SMD in 1 sector (goal is 10%, if electronic available)

source & cosmic for ~30% of strips in sector 6 (done)

MIP, pi0 .

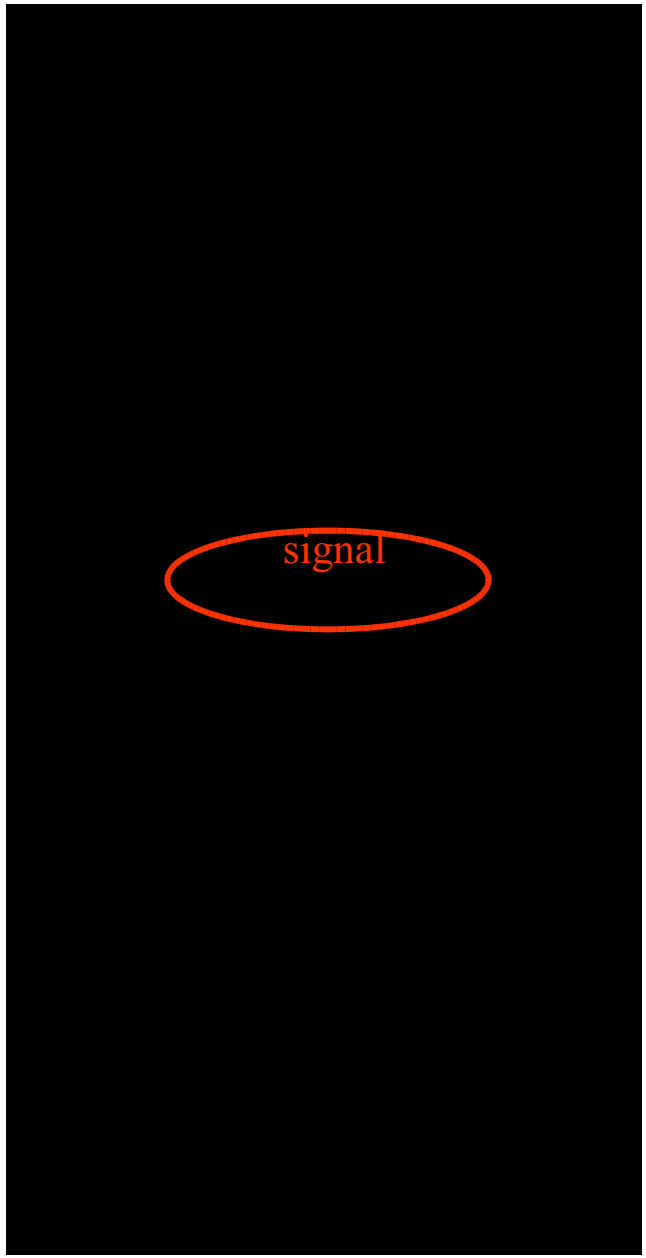
Triggers in Run 3 assumes 10% gain matching for towers

high tower E_T >5 GeV (E+B)

jet patches E_T >6 GeV (E+B)

laser calibration

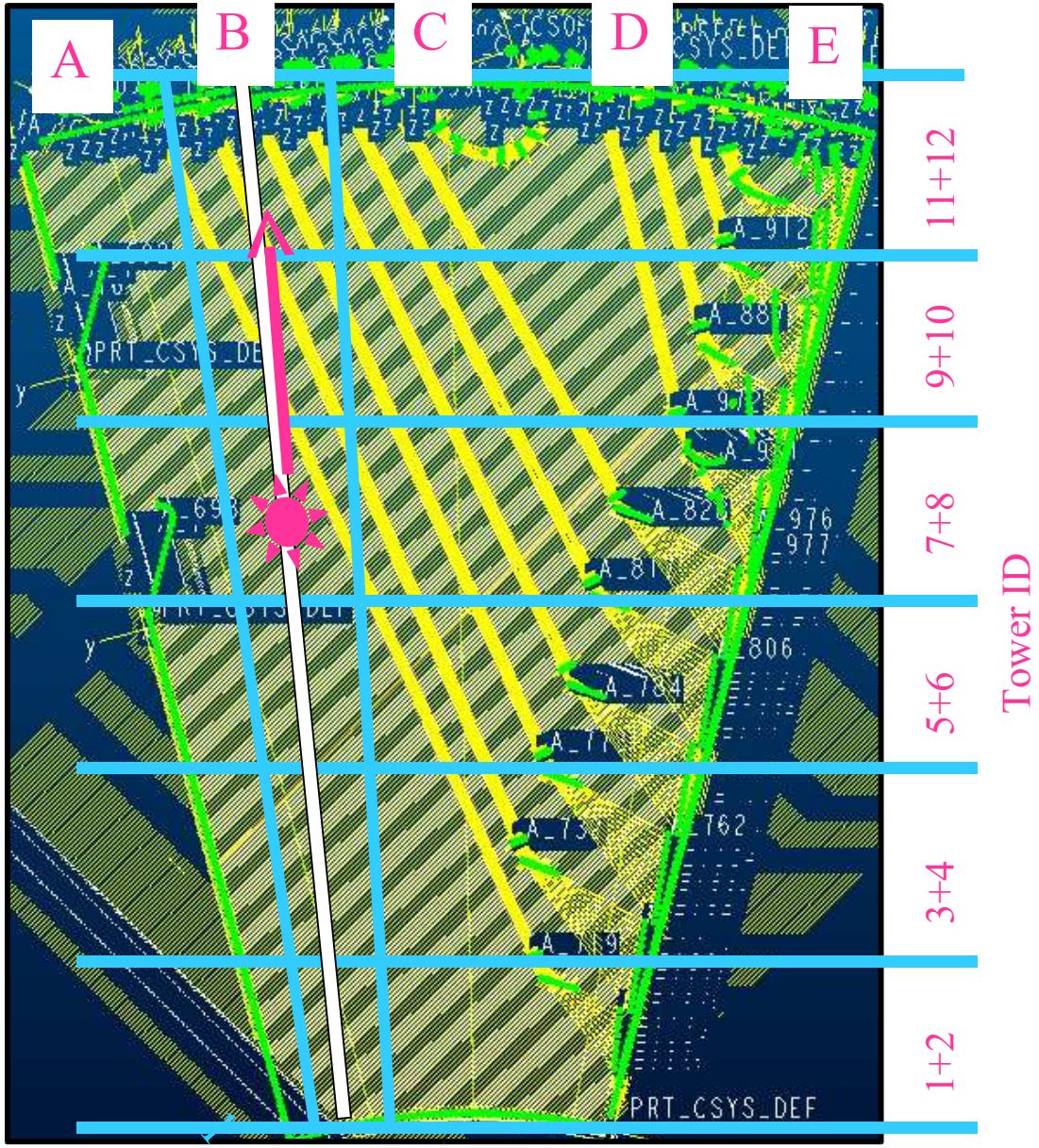
Random trigger response
of 12 TOWERS , sub-sector B



Source Scan @ IUCF (Renee Fatemi)

Speed =0.5 or 1 cm/min , Rate= 10Keve/min

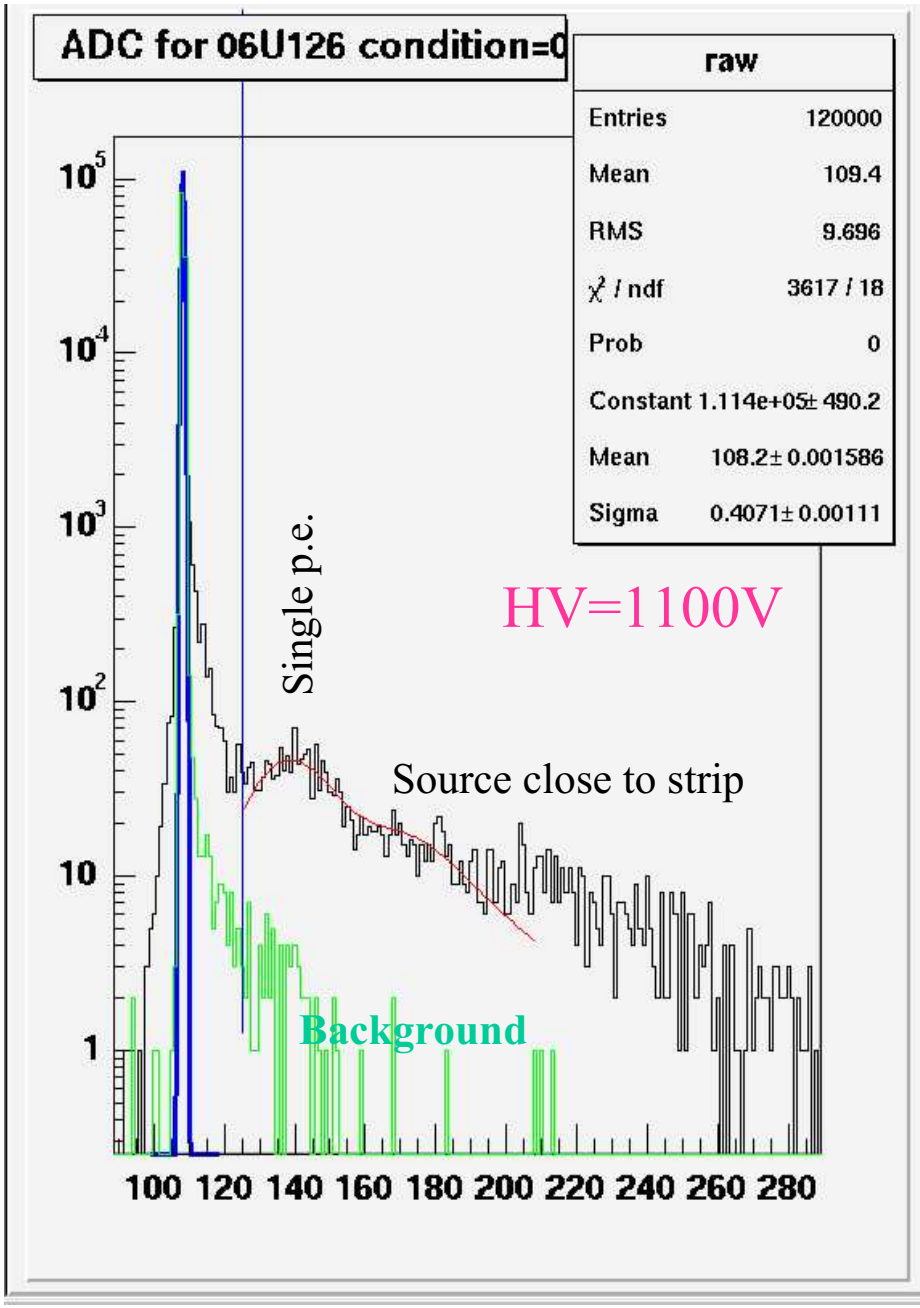
(300 uC, Cobalt)

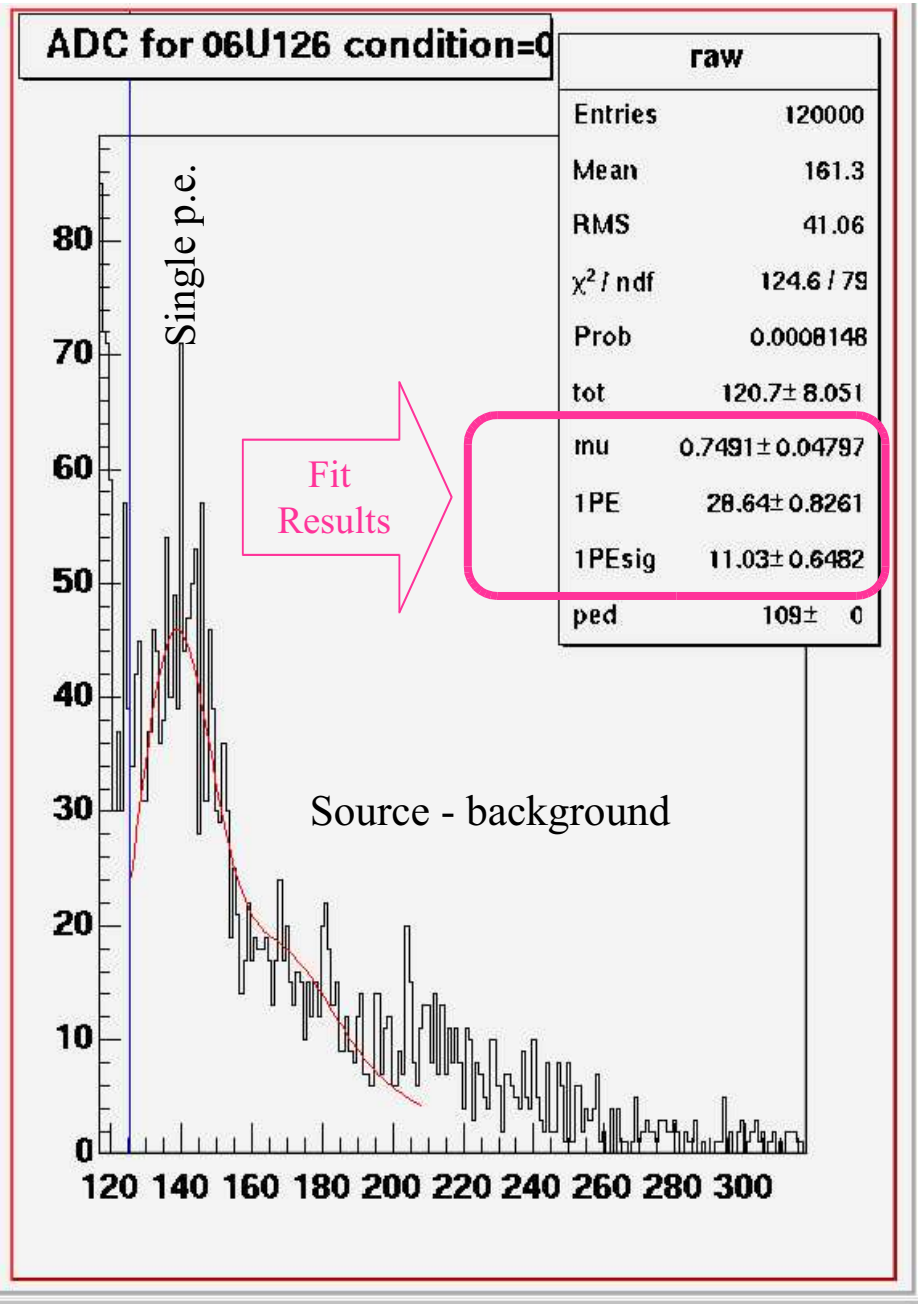


Random trigger response
of one SMD strip

Source Scan @ IUCF (Renee Fatemi)

Speed =0.5 or 1 cm/min , Rate= 10Keve/min





EEMC software (all work in progress)

Actual EEMC in CVS (almost)

Details, examples at http://www.star.bnl.gov/STAR/eemc/

Simulation of Trigger response

Slow control

Calibration DB

Calibration code ♥

DAQ StEvent ♥

Hit/ raw histo display ♥

Tracking: η>1.5, matching ♥

Cluster finder/ PID ♥

M-C : slow simulator ♥

Legend:
♥ **service job**

EEMC needed not only for spin physics !

Help in software development from whole STAR appreciated

List of service jobs http://www.star.bnl.gov/STAR/eemc/ soft

Key software for ppSPIN+EEMC (1)

Non-spin utilities

EEMC Calibration

- towers code (MIP*, π0* towers , ρ+♥ ,W ♥) {1+1+1+3}

- SMD code (MIP, π0) {1+2, Les, Bernd}
- *determine new HV code ↔ DB {Renee ?}
- interface to MiniDAQ {0.5 once it runs}
- generate calibration values
  - Towers* {6 }
    - Use source calibration from IUCF to setup* max gain at E_T=60GeV {1 Renee}
    - cosmic/collisions
  - SMD {6}

BEMC Calibration

- *we relay on its existence

EEMC DB

- *DB I/O code {3, J+P}
- *fill+test DB {0.5}

Tracking

- at η>1.5 (ITTF seed finder} {2} ♥
- track matching: towers,SMD {1} ♥

infrastructure

- *add EEMC to StEvent* +MuDst* {1 } ♥
- *archive DB : EEMC & spin {0.1 for Jeff }
- *DAQ event reader (copy of BEMC) {0.5} ♥

EEMC graphics (primitive)

- *eve-by-even hits {2, J+Paul N.} ♥
- *(un)conditional simple histo {2} ♥
- DB content : gains HV {2} ♥

Simulate of response for FY03

- *off-line code emulating trigger { 2, Renee}
- *run MC to get trigger response {1, Renee}
- *MC evaluate trigger bias for q-jets vs g-jets {1, Renee}
- evaluate trigger bias for A_{LL} {0.5} ♥
- run minb MC to get tower MIP response {0.5} ♥
- *L2 code for rotating jet patch {1 @BNL, Renee}
- L3 code for pileup {1 @BNL}, J+P+L3 tests, for use in run-4
- Tower slow simulator {6} ♥
- SMD slow simulator {6} ♥

Legend:
* needed for FY03 run
{ time in months}
J+P = Jan+Piotr
- some code exist
assuming above is done
♥ **service job**

Key software for ppSPIN+EEMC (2)

Non-spin analysis

Hit & Event reconstruction B+E EMC

- *vertex finder with pileup {3, Jon G.} ♥
- *add SVT + B/E-EMC to vertex {12} ♥
- *test off-line pileup rejection {3 } ♥

} vertex

- *tower cluster finder
  (use non-segmented EEMC) {3} ♥
- * reco γ energy, isolated towers {3 } ♥
- π0 / γ / hadron disc. Towers {6 } ♥
- reco γ energy , charge subtracted {3 } ♥
- π0 / γ disc. SMD {3} ♥
- TPC jet reco* {Akio, Konstantin}
- TPC*+B*/E-EMC jet reco {1 year } ♥
- reco γ+jet kin. {1 }
- reco W {3} ♥
- other analysis

spin analysis

Run time spin DB

- *accommodate new CNI results ♥
  - discard bunches,
- upgrade* daemons {0.5 P}
- update display {0.5 , Joanna ?} ♥

Spin related software

- quantization axis for 2-jet events {1} ♥
- incorporate Joannas scaler analysis in QA ♥

Legend:
* needed for FY03 run
{ time in months}
J+P = Jan+Piotr
- some code exist
assuming above is done
♥ **service job**