

# **ITEP activity**

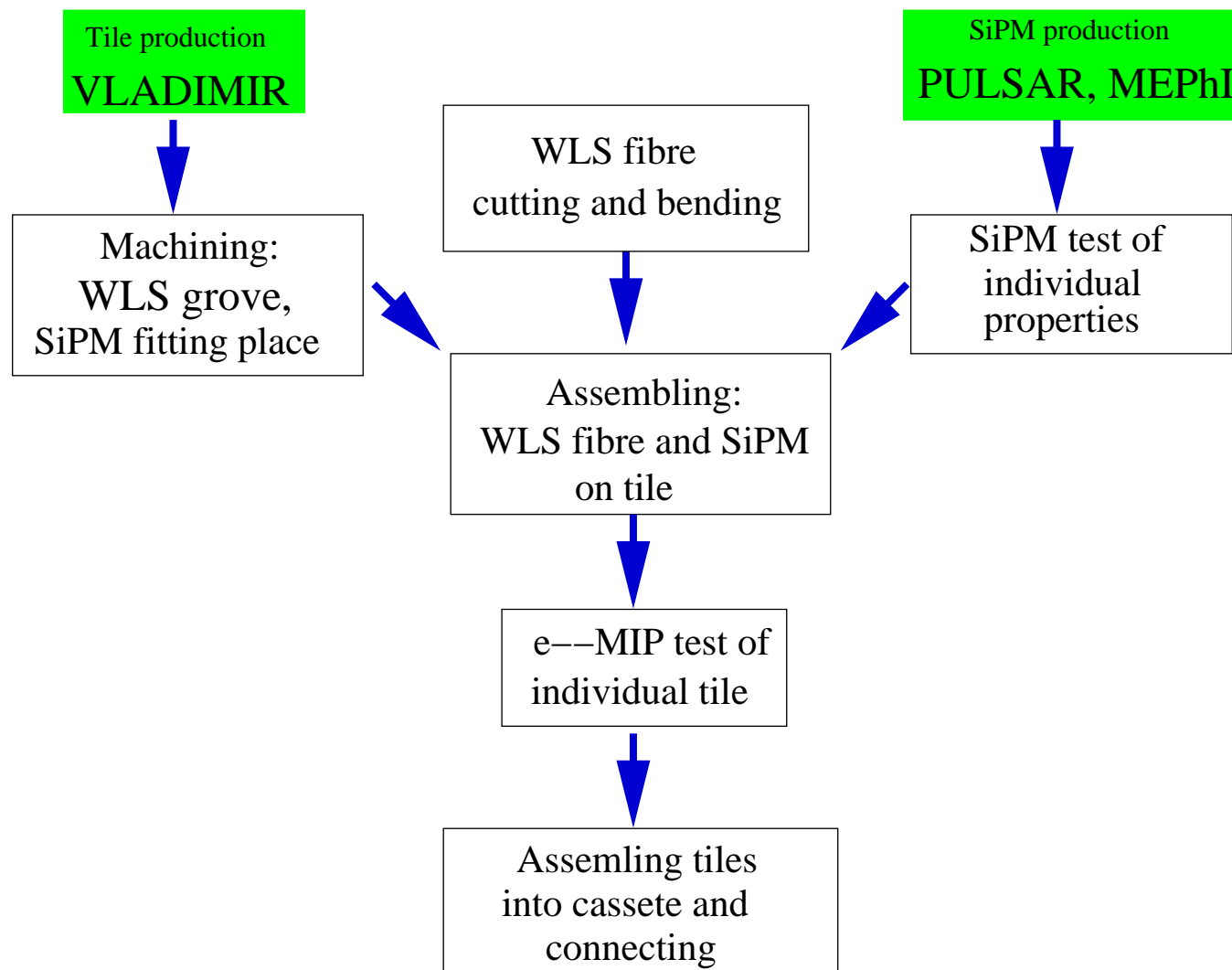
on HCAL prototype cassette mass production

by ITEP's CALICE collaboration team

ITEP, Moscow

ECFA Workshop, 1–4 September 2004, Durham

# ITEP cassette mass production



## VLADIMIR tile production and control

by 20 August 2004

3000 tiles  $3 \times 3 \text{ cm}^2 \Rightarrow$  done and mated

approximately 600 tiles  $6 \times 6 \text{ cm}^2 \Rightarrow$  done, mating in progress

First sample of  $12 \times 12 \text{ cm}^2$  tiles  $\Rightarrow$  done

ITEP and VLADIMIR also provide:

Light yield control for each produced tile

Quality control of tile edge mating

} record to database

## PULSAR, MEPhi SiPM production and control

ITEP receives SiPM's with measured starting Geiger mode point  $U_0$   
and dark current value that recorded to the database.

by 20 August 2004

First pilot set near by hundred of SiPM are delivered

# Tile machining and WLS preparation

## Tile machining:

- groove for WLS fibre
- fitting place for SiPM
- fitting place for reflector

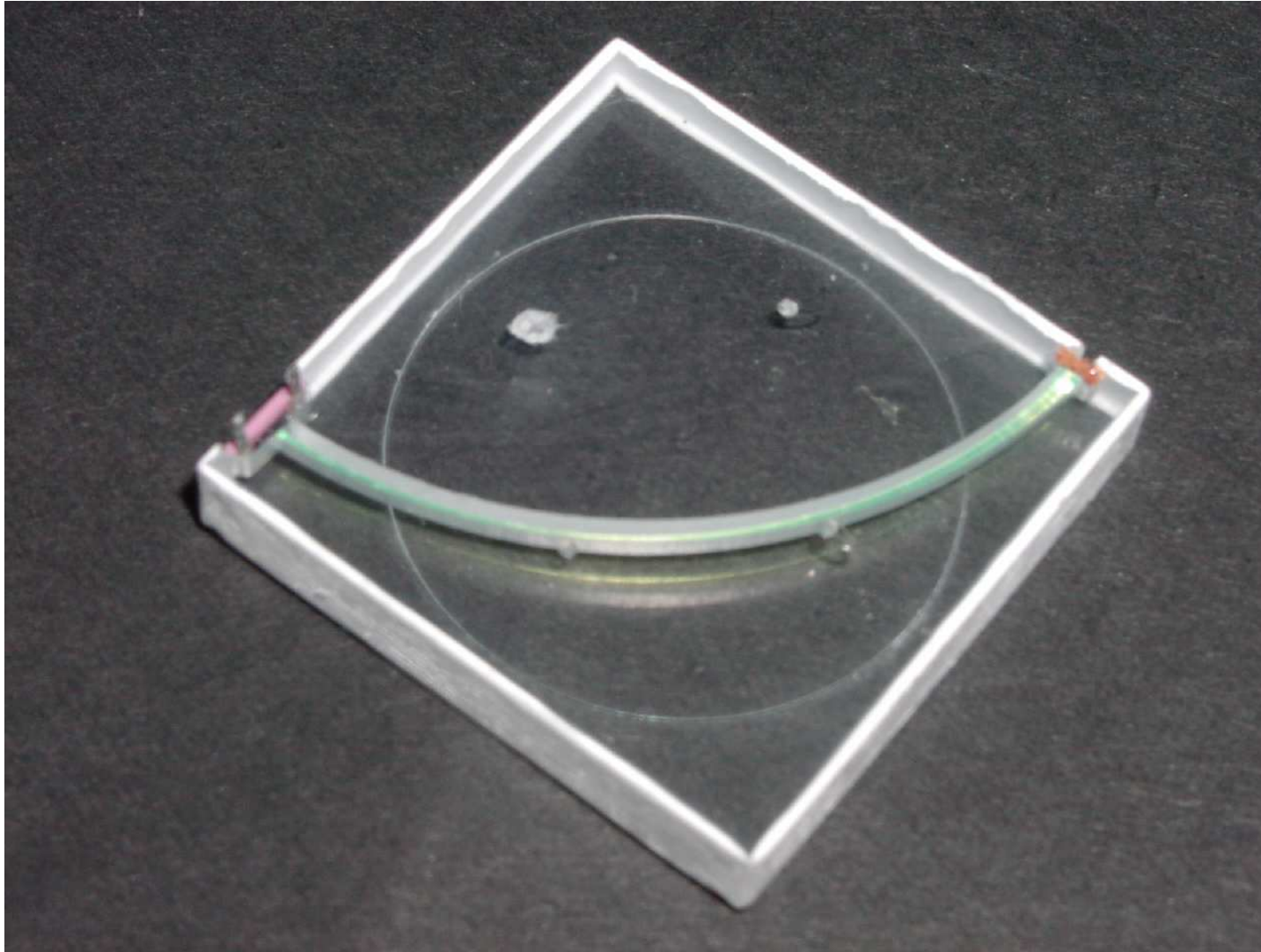
} machine is ready for mass production

## WLS fibre preparation:

- Precision cut of WLS fiber to produce exact length and polished edges
- Thermal bending WLS fibres for 6x6  $cm^2$  tiles

} machine is almost ready for mass production

# Ready 3x3 tile



# SiPM individual test

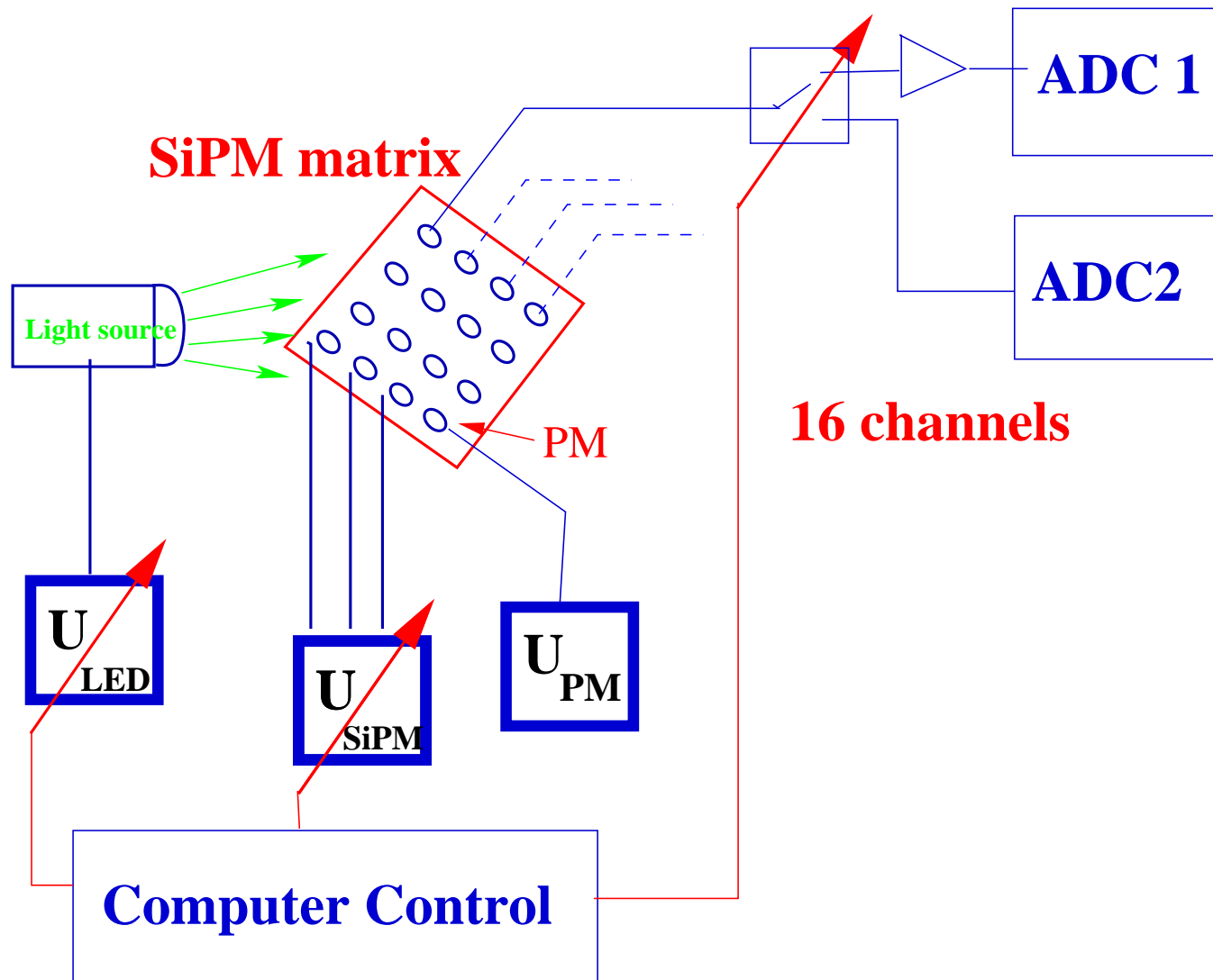
- |  |   |  |
|--|---|--|
| <ol style="list-style-type: none"> <li>1. <b>Rejection of bad devices</b></li> <li>2. <b>Choosing of working voltage point</b></li> <li>3. <b>Measurement of the main SiPM parameters</b></li> </ol> | } | <p>Low light flux, with preamplifier,<br/>scan by voltage and light flux</p> |
|--|---|--|

As the result:  $U_{work}$ , gain, cross-talk, noise frequency  $\Rightarrow$  database

- |   |   |  |
|---|---|--|
| <ol style="list-style-type: none"> <li>4. <b>Measurement of response curve</b></li> </ol> | } | <p>High light flux, without preamplifier, scan by light flux</p> |
|---|---|--|

Also goes to database

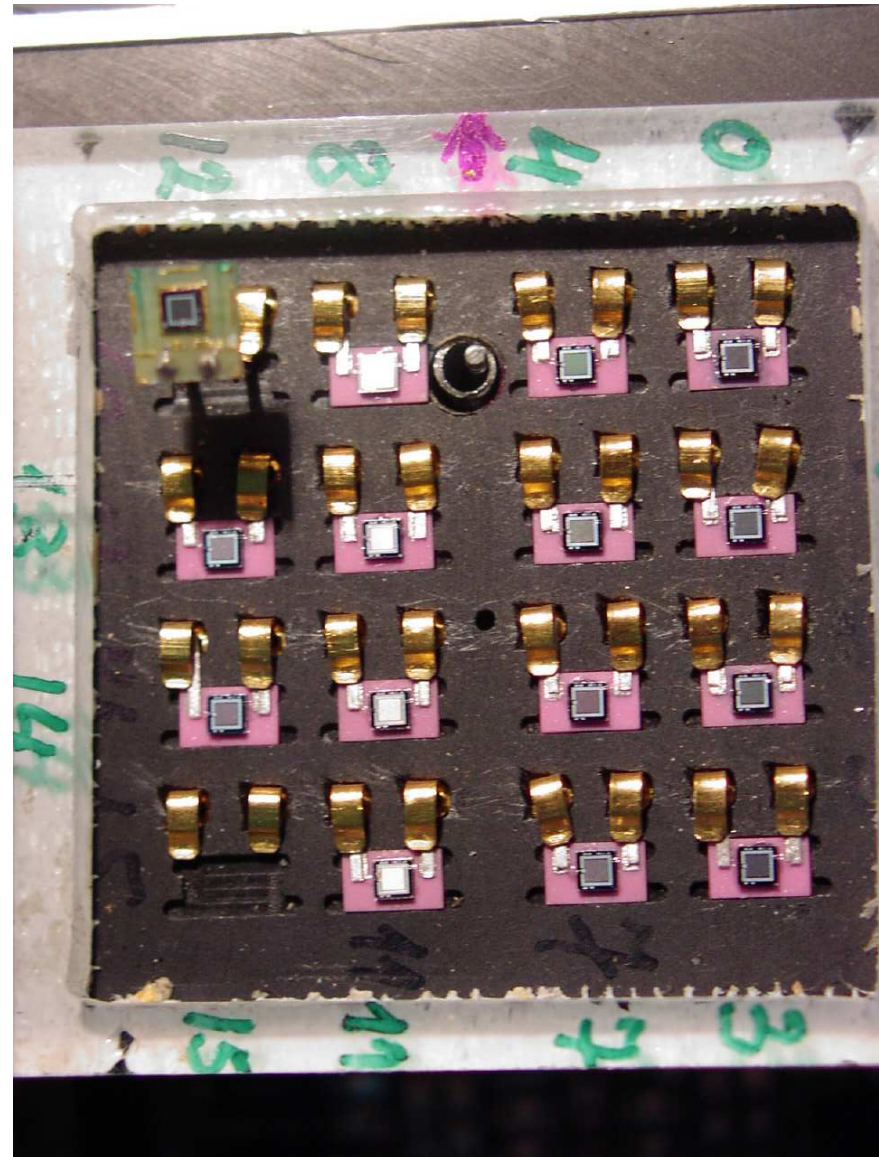
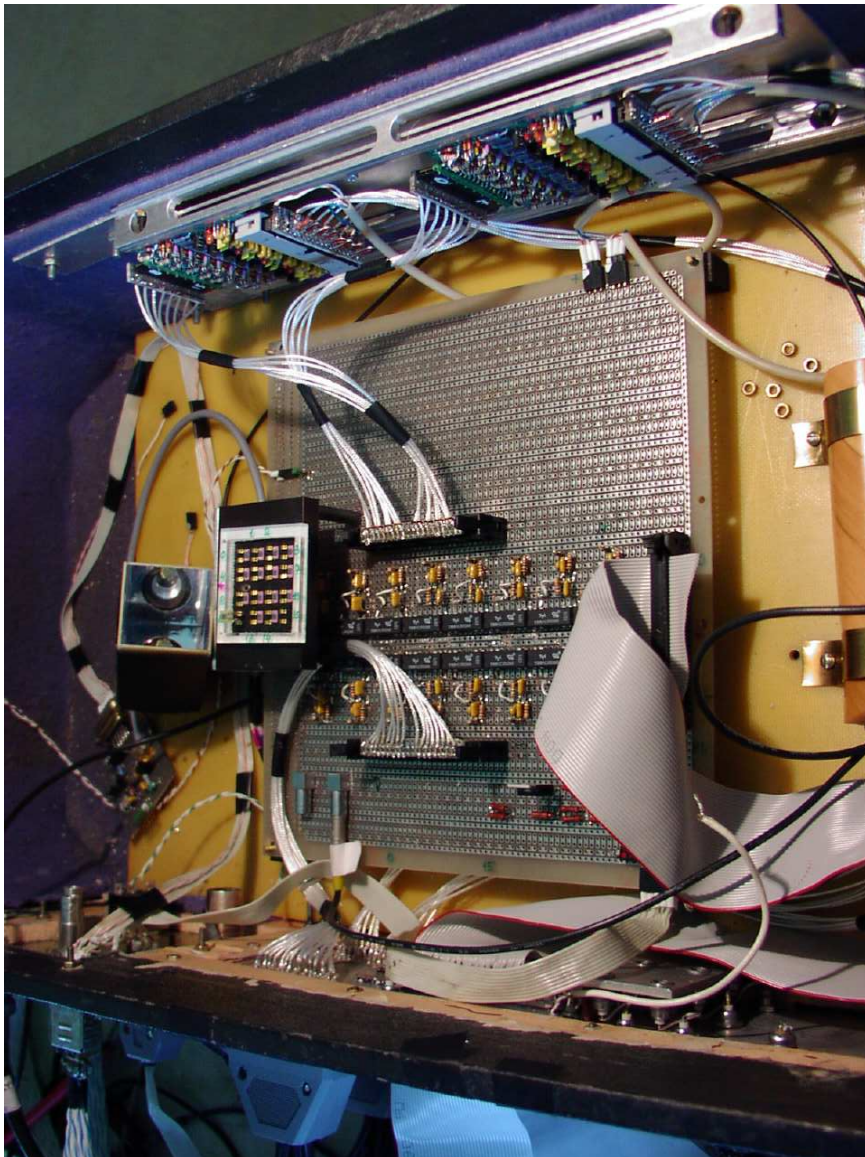
# SiPM individual test, scheme



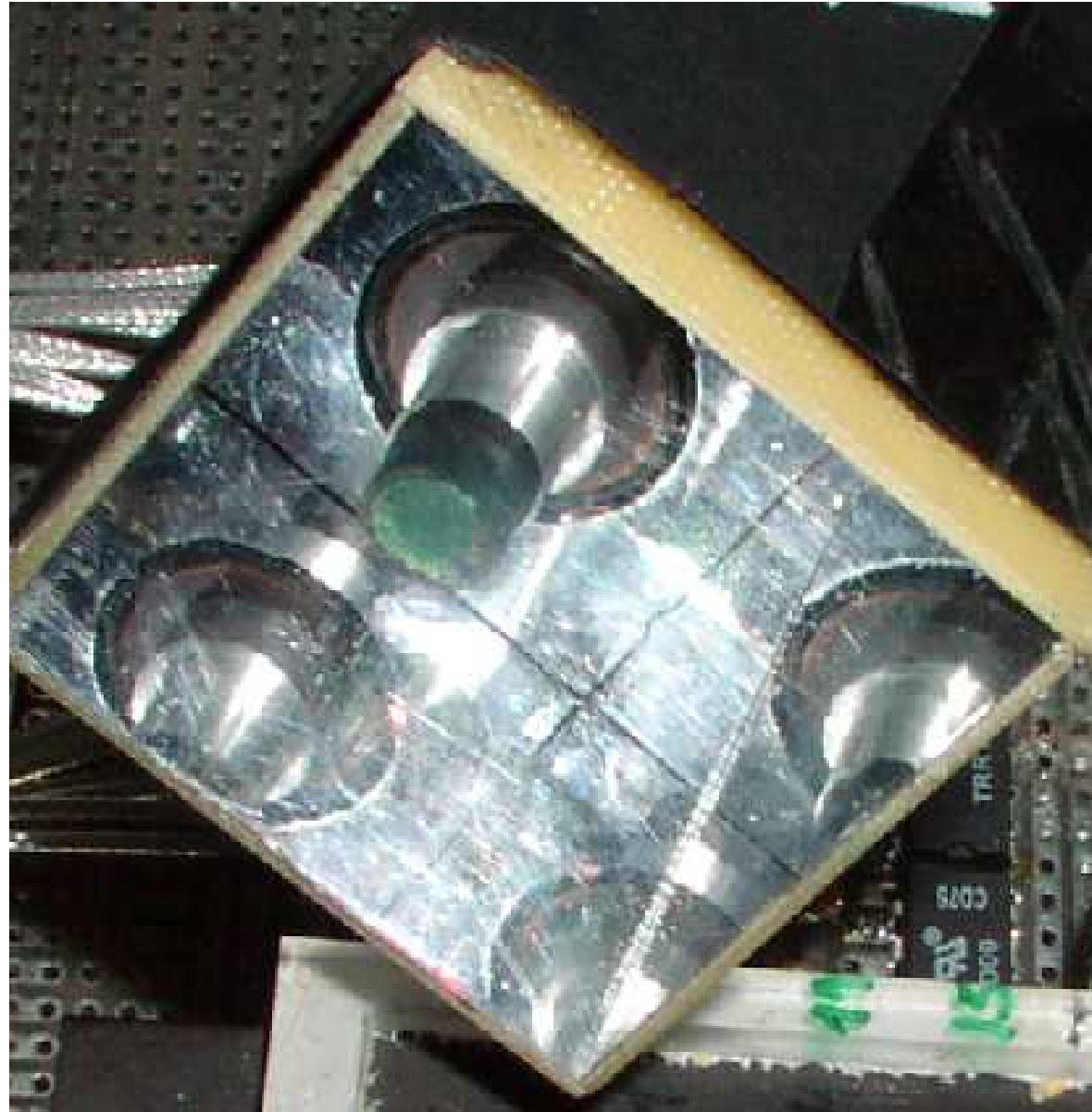
**16 channels**



# SiPM individual test, view



## SiPM individual test, green light source



## SiPM individual test, software

Software for individual SiPM test is ready.

DAQ includes:

Full automatic run control, programmable in advance and/or online ⇒

Setup frequencies of different triggers

Setup and stepping light source flux

Setup and stepping working point for each SiPM separately

Switch on/off preamplifiers

Reading of raw data (16 channels) – recording to database

Extraction SiPM parameters from data, as main result – recording to database

Temperature – recording to database

Support of database

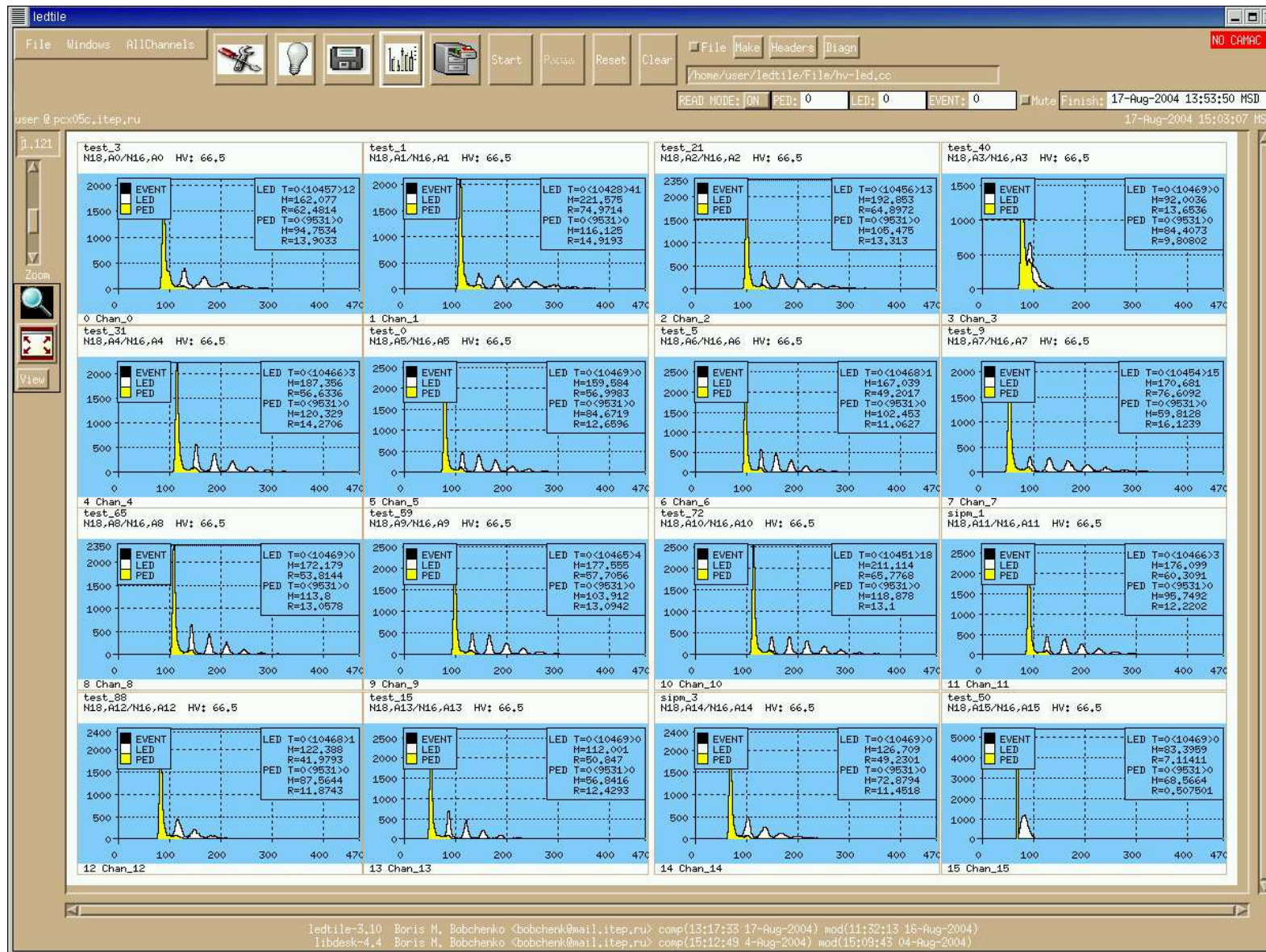
Online histogramming and calculations of SiPM properties – on screen

DATABASE established on LINUX Postgresql

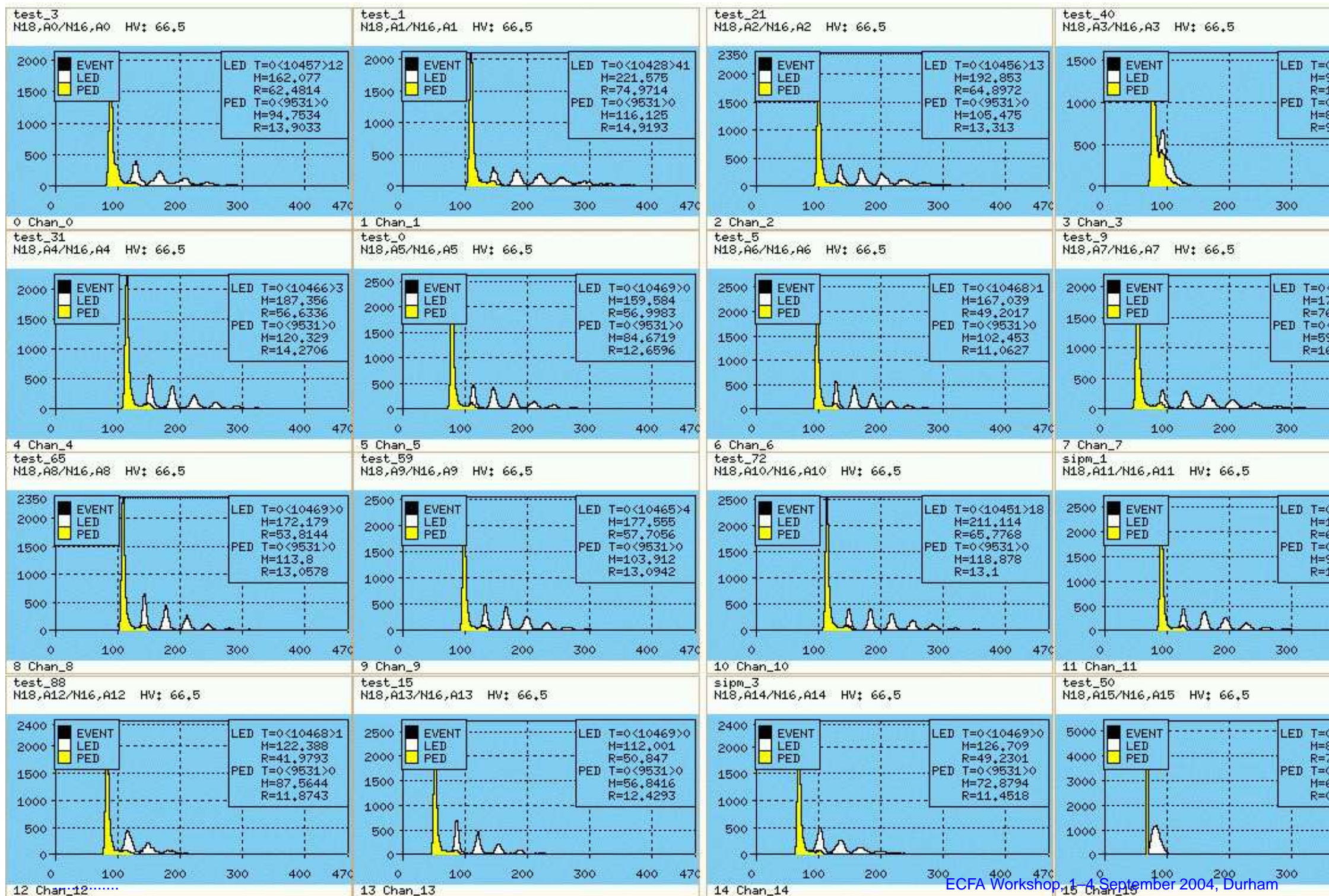
It includes structure of PULSAR and MEPHl test data.



# DAQ running screen







## SiPM individual test, to do

Test setup and DAQ tuning

Understanding of rejection and finally recording parameters

Mapping of light flux upon SiPM matrix

Calibration curve for high light flux

Amplifier and ADC cross calibration

} in progress

Need larger set of SiPM

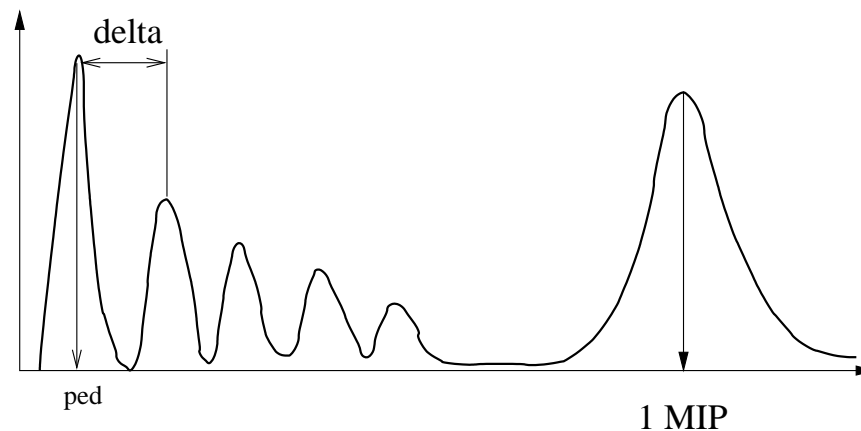
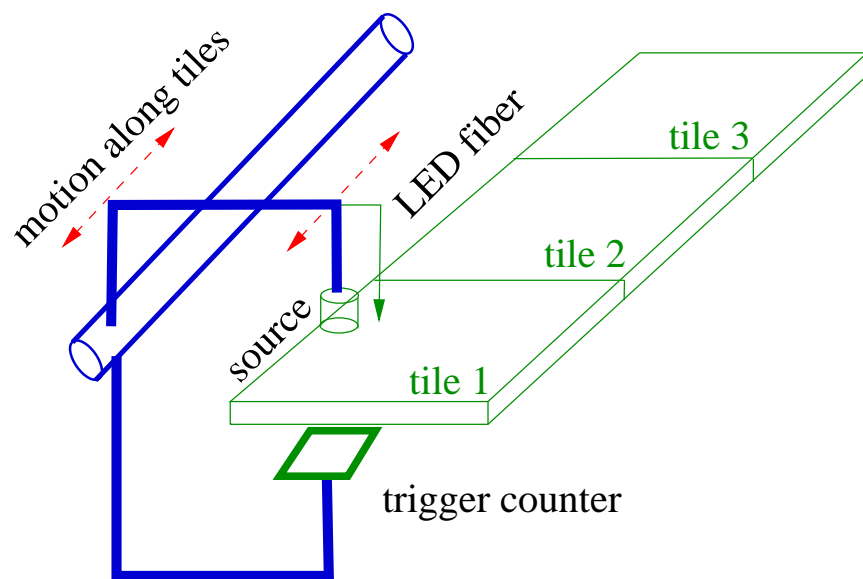
## Assembling WLS fibre and SiPM on tile

Technological procedure is ready

# Tile individual test, aims

One point scan of each tile with  $\beta$ -source and low light flux at the same time

Quality control of tile assembling  
and measurement of MIP position in pixels

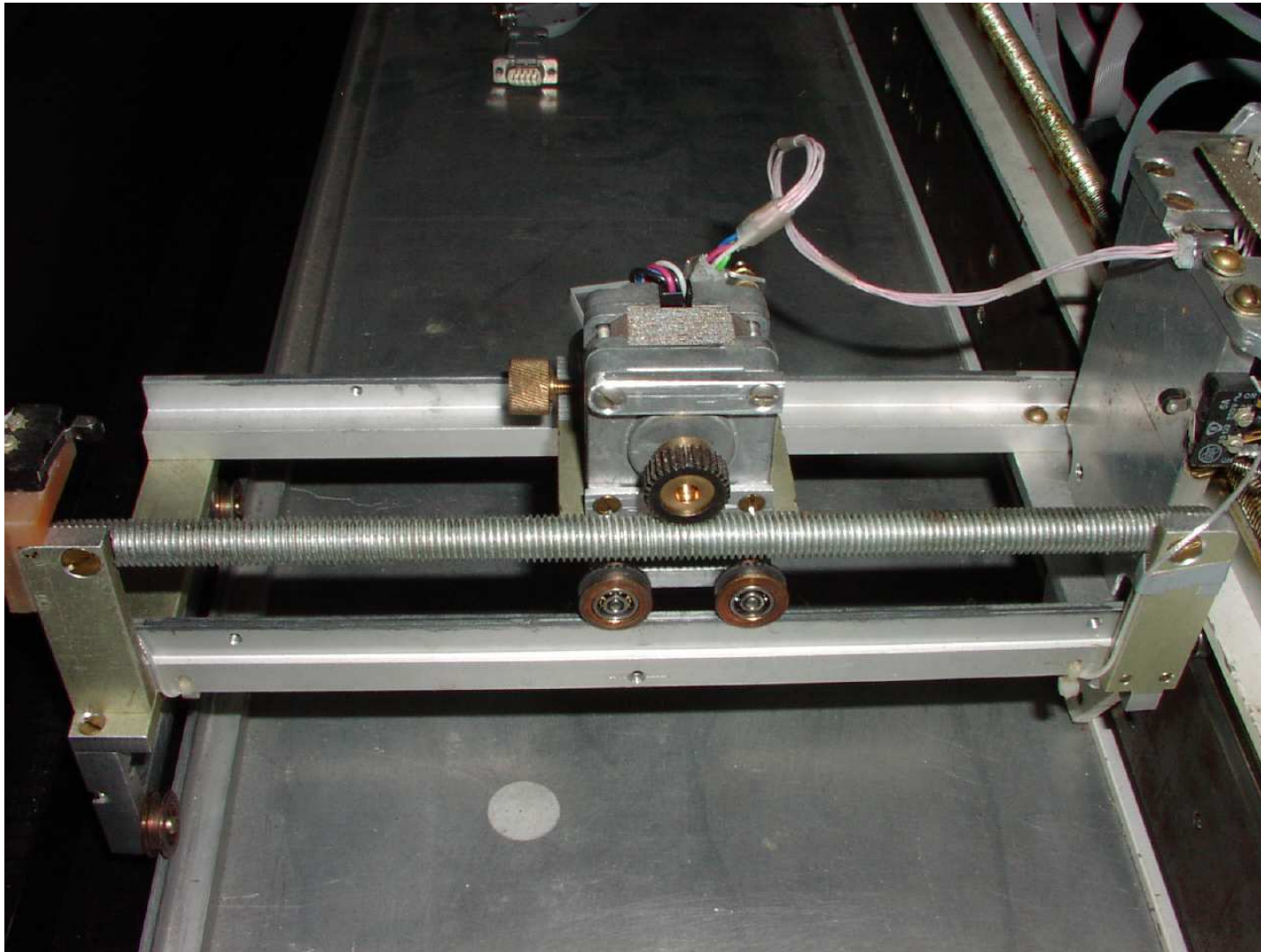


Software is under development, partially ready.



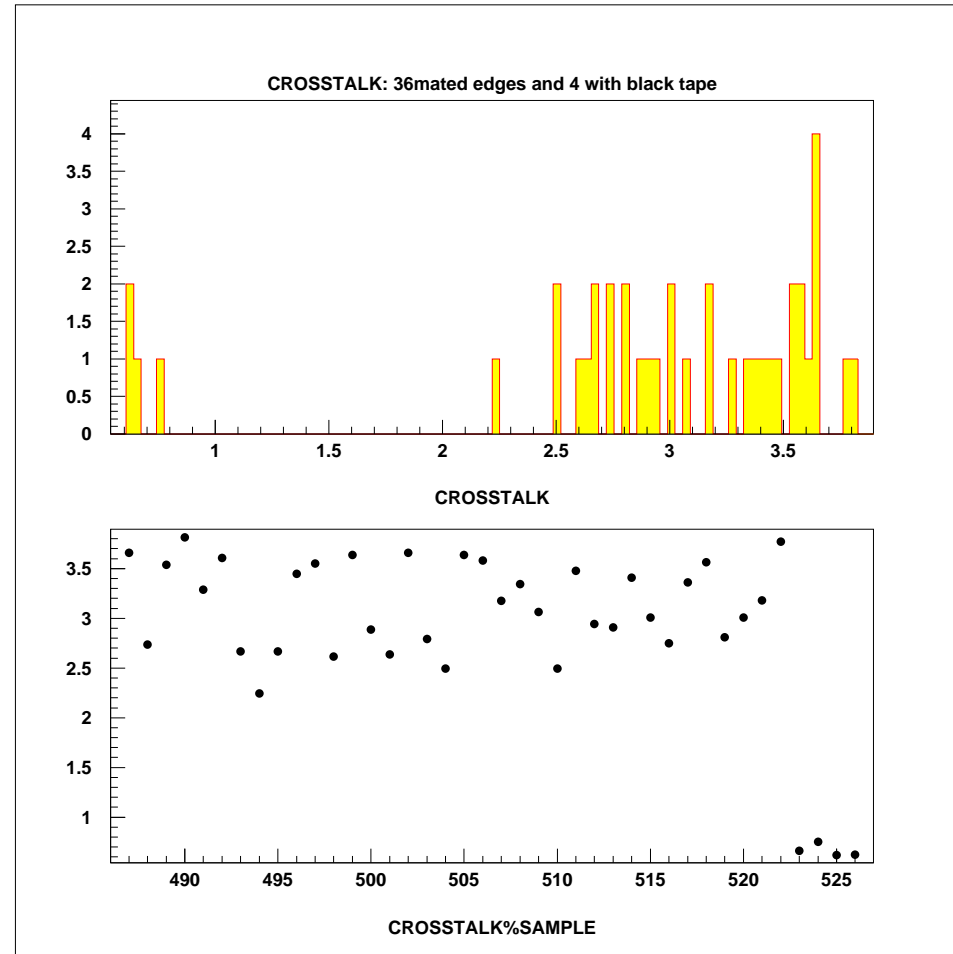
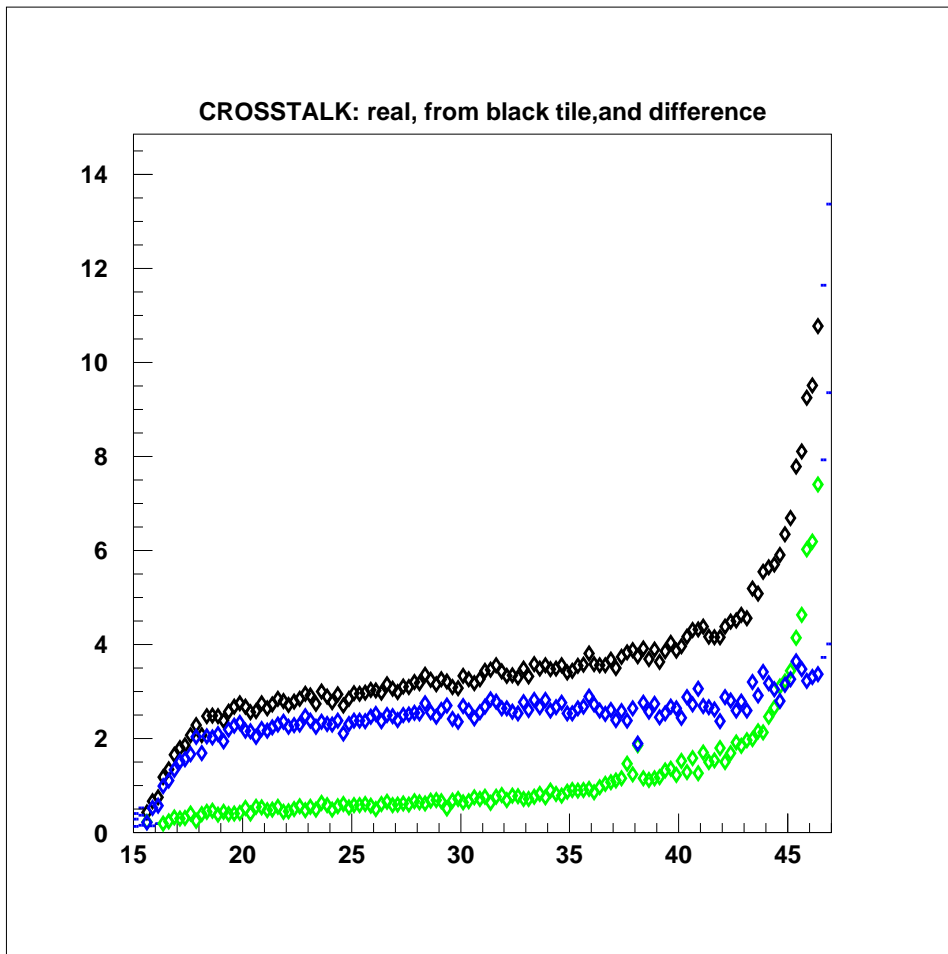
# Tile individual test

Mechanical part is almost ready



# Light cross talk

Scan by source along tile with 0.25 mm step, read neighbour tile



Conventional edge mating – black

Black tape edge wrapping – green

Difference – blue

## **Assembling tiles into cassette**

Technological procedure is under development