MALKHAZ JABUA

GEORGIAN TECHNICAL UNIVERSITY
Faculty of informatics and control systems

Two weeks in FORSHUNGSZENTRUM JUELICH

15.11.2010 - 30.11.2010

IKP (INSTITUTE FÜR KERNPHYSIK)

Dr. Andro Kacharava gave me a great introduction excursion at IKP. We met with many people working here.

At first Prof.Hans Ströher. He met me very ,very kindly. We talked about Informatics, discussed my CV and then of course GEORGIA. He talked about conference in Tbilisi, their tour around GEORGIA, I noticed that he loves my country and has a great wish to support Georgian students.

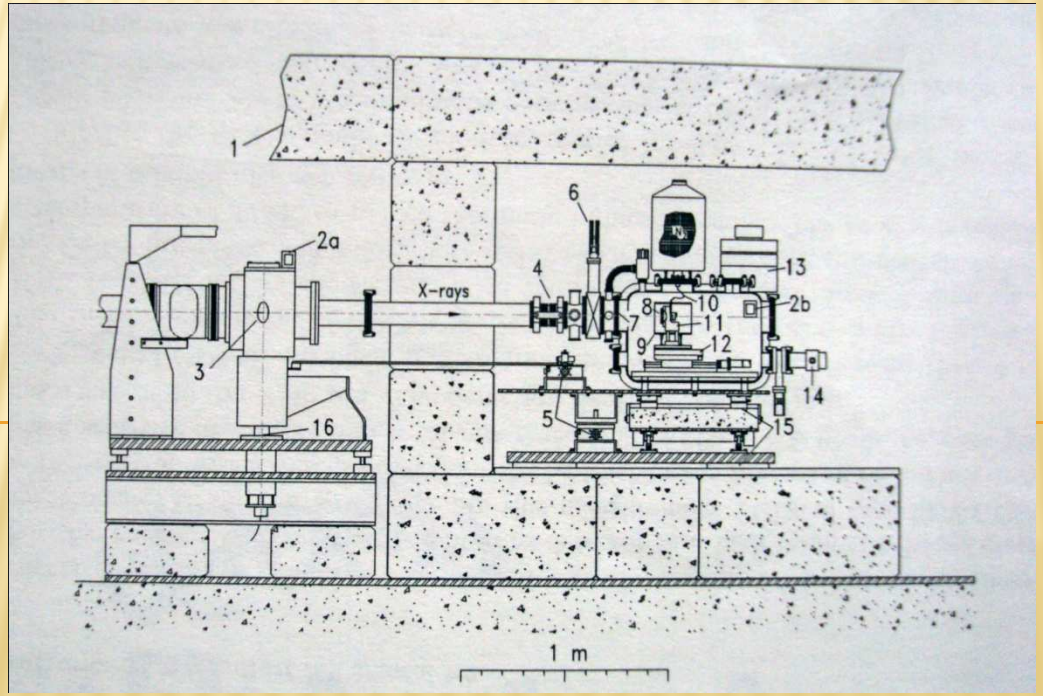
Prof. Ströher gave me useful advices and said: “Our doors are open for you, now you can start your work”.

It’s really enormous support. I gained additional strength inside myself.

At IKP I also met with Dr. Gotta and Dr. Gorke (from ZEL)

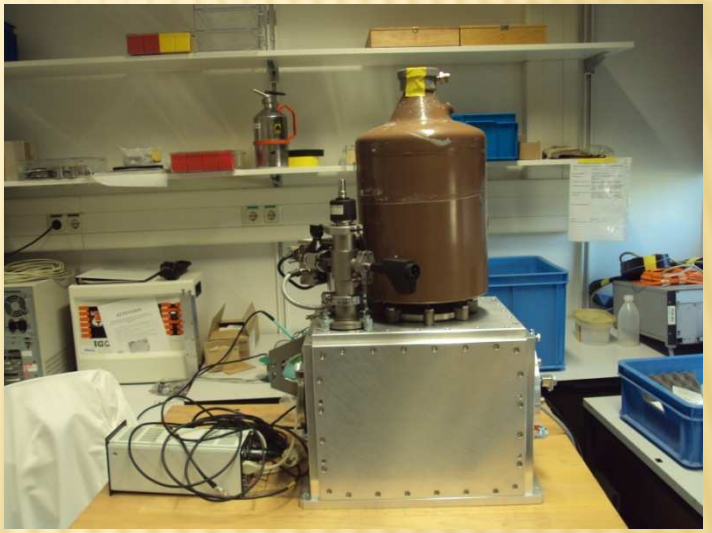
The title of my diploma thesis is: READOUT UPGRADE FOR THE FOCAL PLANE DETECTOR OF THE JULICH BRAGG SPECTROM.

Dr. Gotta works in this field. He gave me all needed information (including articles, literature, papers ...) about this project.

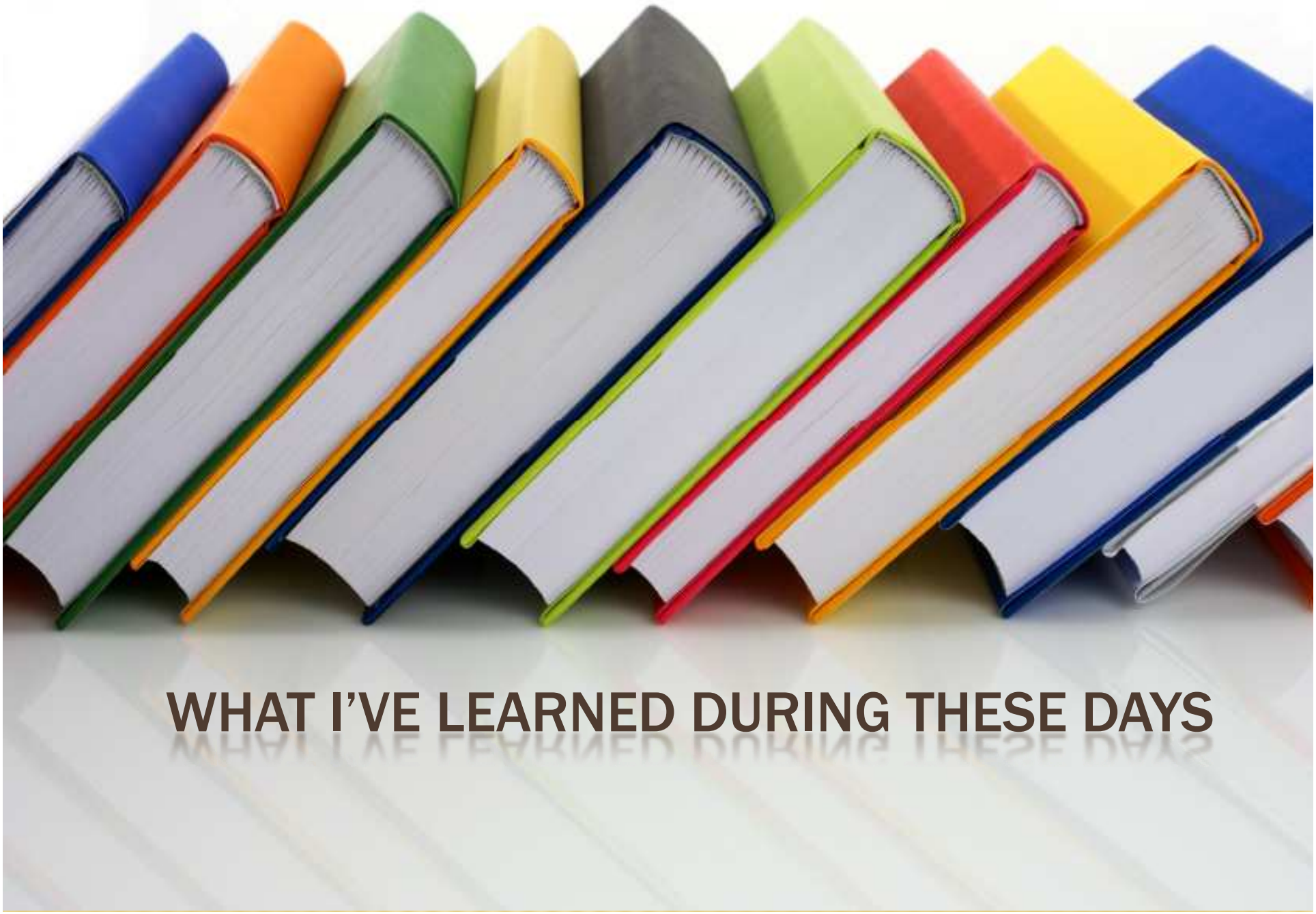


After reading the material, I had a lot of questions with Dr. Gotta. He kindly explained me everything. Many aspects became clear. Day by day I was moving forward, my knowledge received some shape, I have got deeply interested.

Dr. Gotta was guided me to the laboratory. We saw the hardware parts of the devices in future we'll work with. He gave me detailed explanation of the whole set-up.



Important moment. I had theoretical knowledge of these devices and now I saw them in practice. So practice and theory filled each other and made me more confident and equipped.

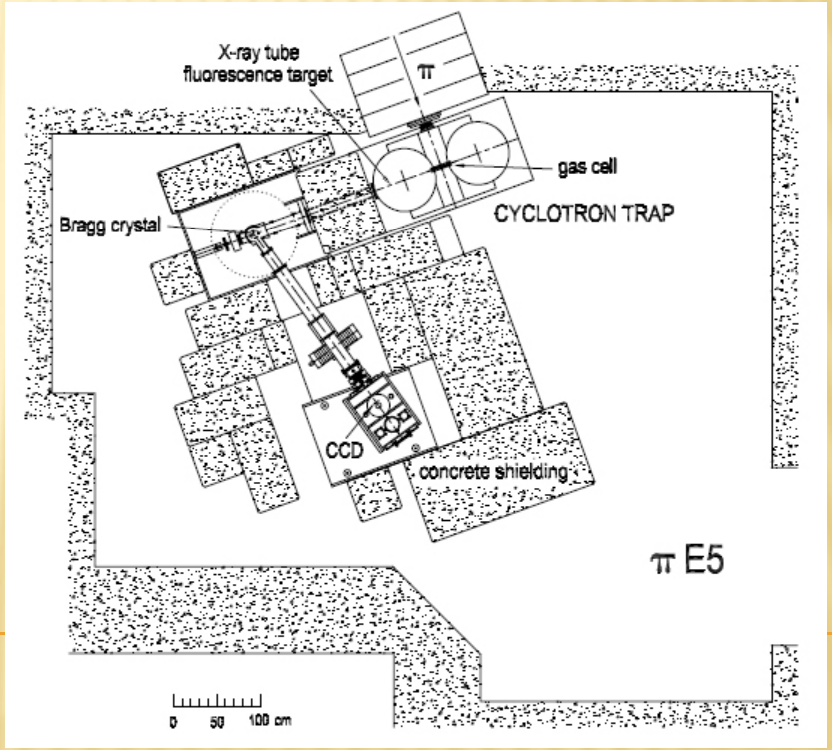


WHAT I'VE LEARNED DURING THESE DAYS

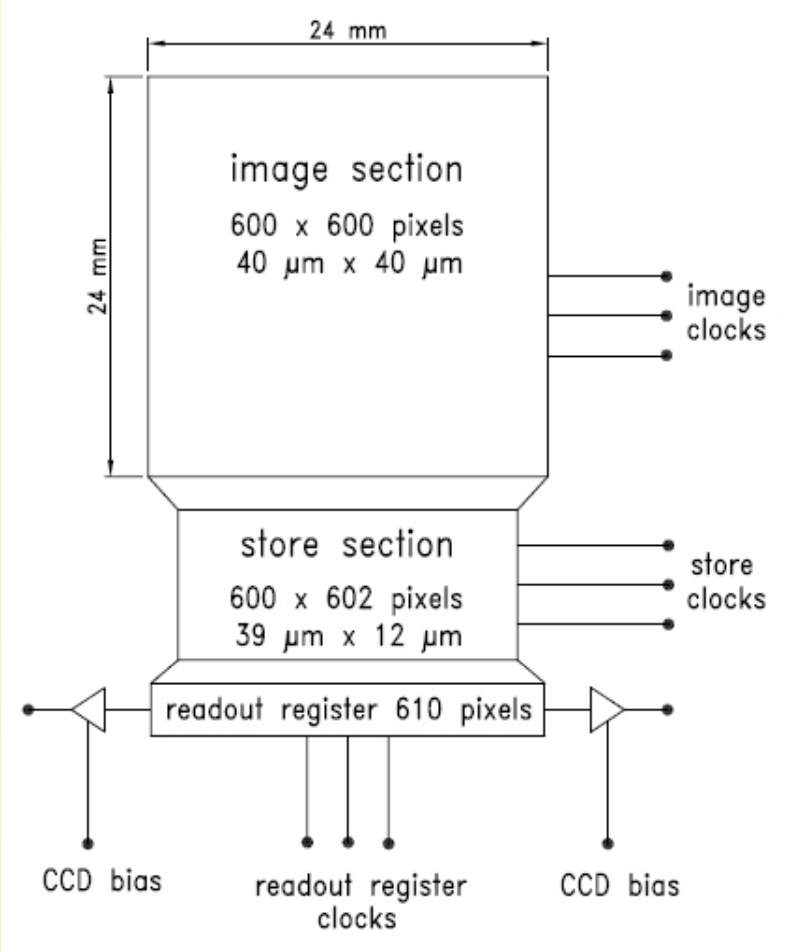
I received theoretical and practical knowledge about topic READOUT UPGRADE FOR THE FOCAL PLANE DETECTOR OF THE JUELICH BRAGG SPECTROMETER.

In concrete:

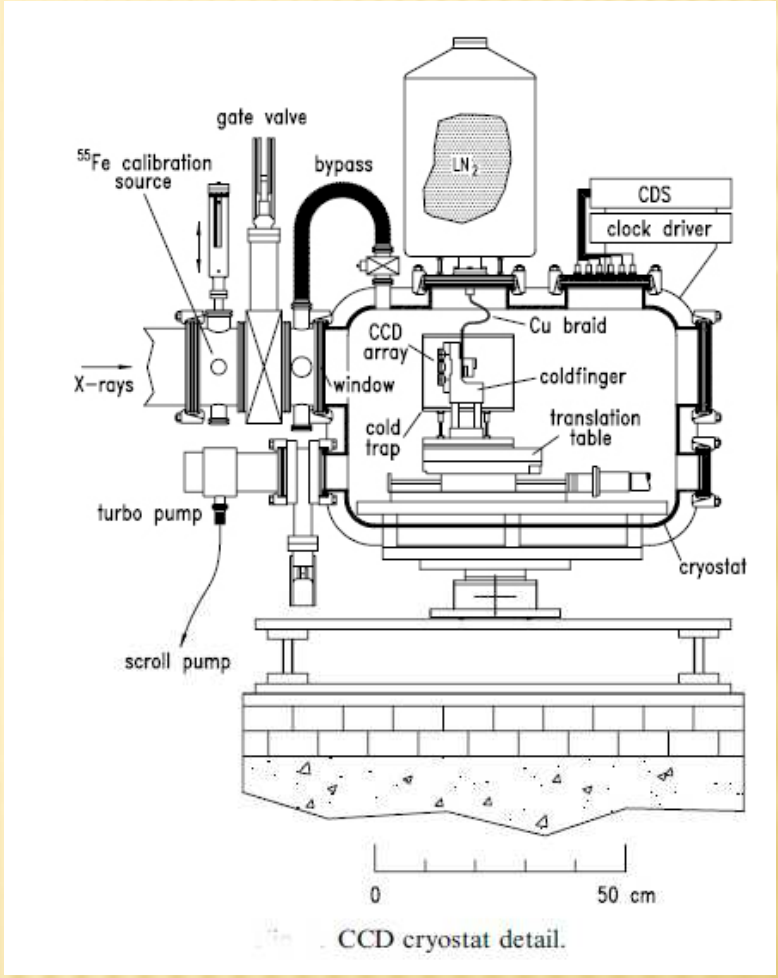
- Types, structure and working principle of CCD
- Nature of X rays
- Detector requirements
- Cryostat description
- CCD alignment and positioning



- Setup of optical measurement
- Measurement of active pixel distance
- Measurement of the relative orientation of CCD's
- Bragg crystal and it's features
- Spectrometers
- Muons and exotic atoms
- Timing, temperature control, signaling standards
- Dual slope technology, ADC, CDS, sampling

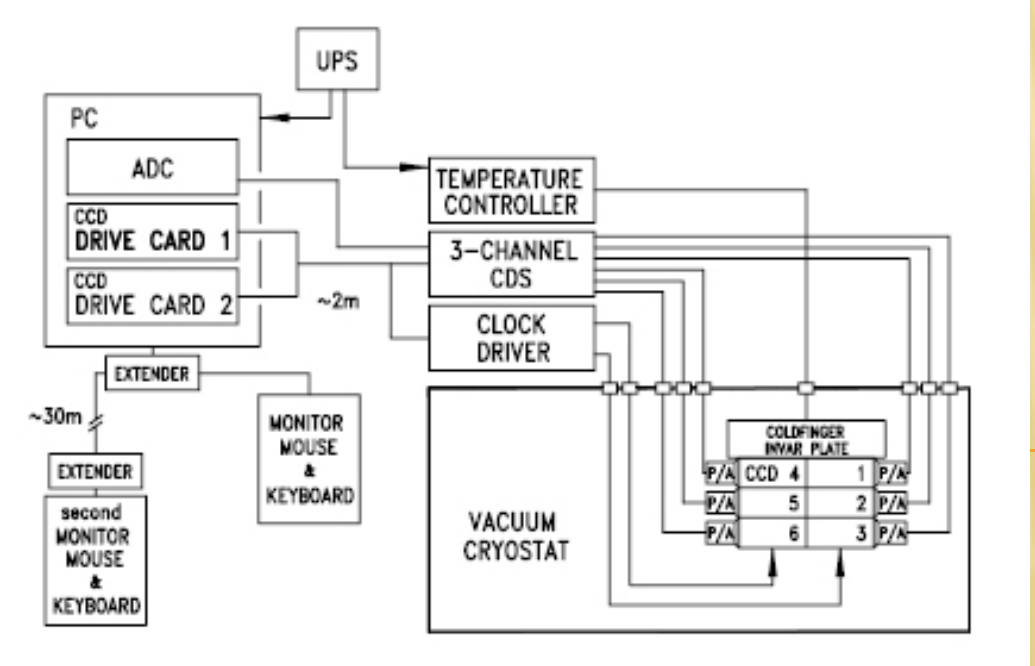


Each CCD22 is assembled on a thermally isolated package, with connection to a cold-finger for cooling. Electrical connection for clock and bias signals is provided through a kapton flex-circuit. The six CCDs are mounted in a 2- column by 3-row array on a single, invar coldfinger. This provides a total imaging area of 48mm72 mm. There is a maximum gap of 500 mm between CCDs and they are rotationally aligned to better than 7 mrad. The whole assembly is housed inside a custom built stainless steel vacuum cryostat.



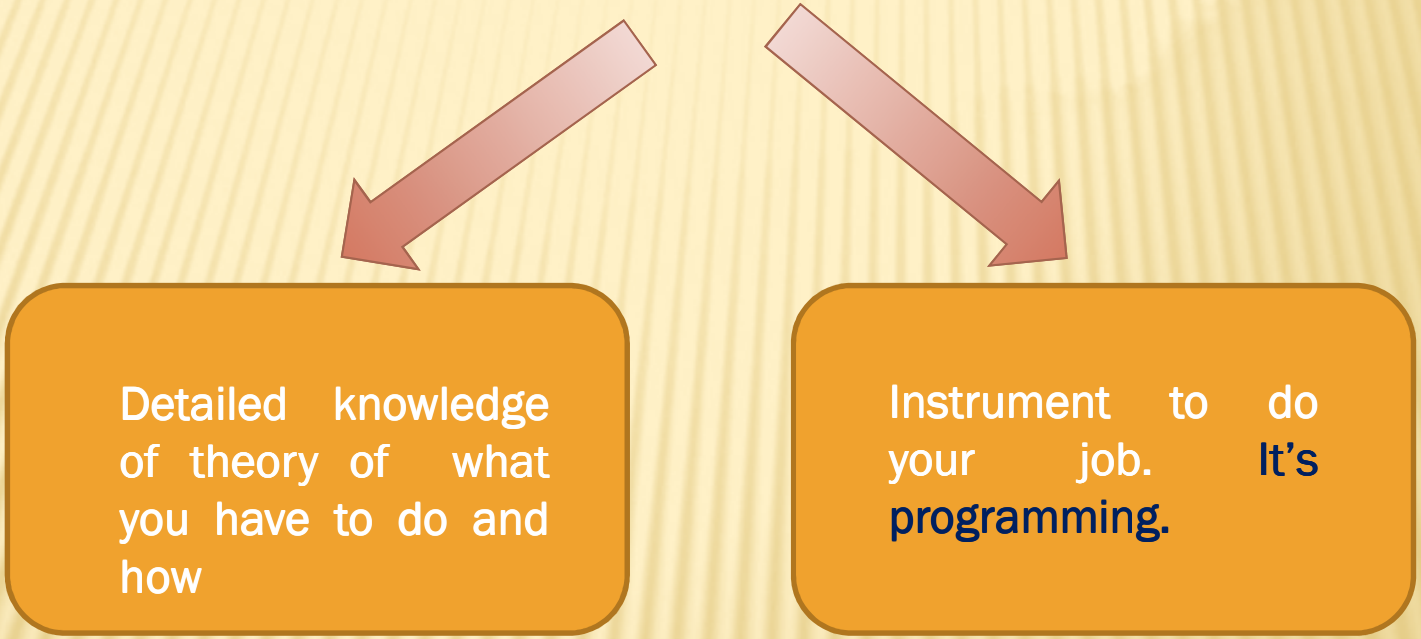
CCD cryostat detail.

The six CCD22 devices are controlled from an IBM compatible PC using a combination of custom and commercial electronics . Two PC expansion cards supply software programmable bias voltages and clock sequences. These signals are then multiplexed in the Clock Driver box to drive one column of CCDs each. Read-out of the two columns is synchronised, such that the frame transfer of all six CCDs occurs simultaneously.



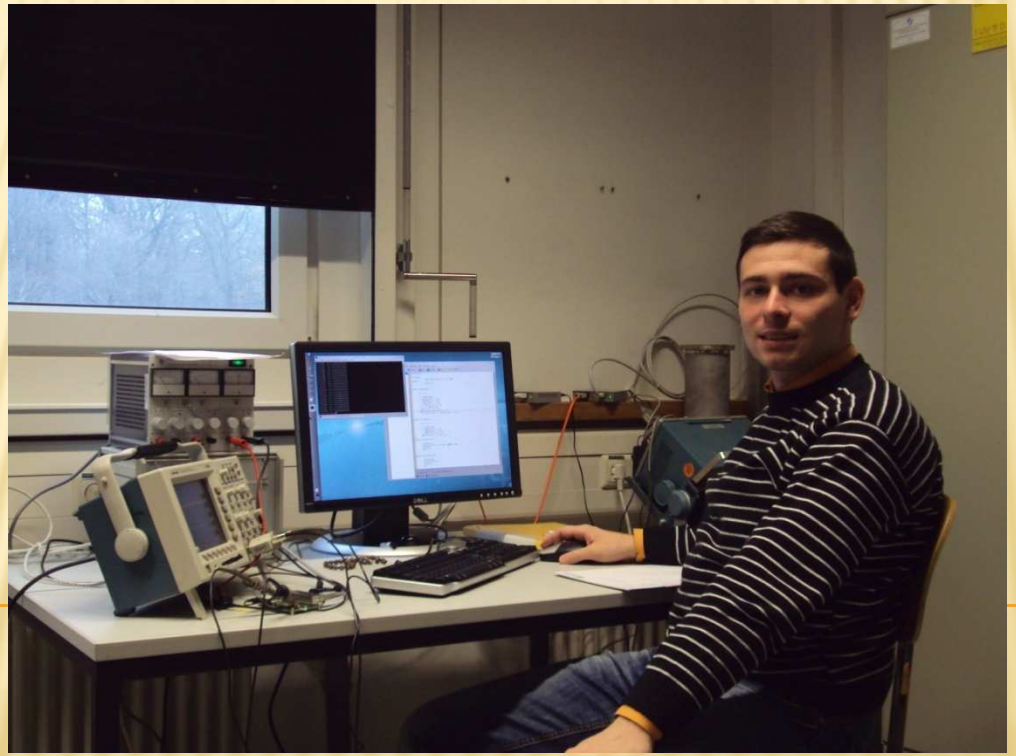
READOUT UPGRADE FOR THE FOCAL PLANE DETECTOR OF THE JUELICH BRAGG SPECTROMETER.

To do this we need



We use C language in order to write a program that controls and implements Readout function from detector.

Dr. Gorke gave me some examples and advices towards this direction.
We have discussed different options for realization.



After this I wrote a small program and received the result on the screen of osciloscope. Program worked , impulses and clocking signals were successfully formed and displayed.

I’m happy ,program works great. Hope I’ll continue in such pace.


WHAT I SAW IN FZJ
COOLER SYNCHROTRON COSY
DES FORSCHUNGSZENTRUMS JÜLICH

COSY (COoler SYnchrotron)

Dr. Andro Kacharava gave me a great introductory excursion at COSY. He explained the main functions of this facility and it's importance.

COSY (COoler SYnchrotron)

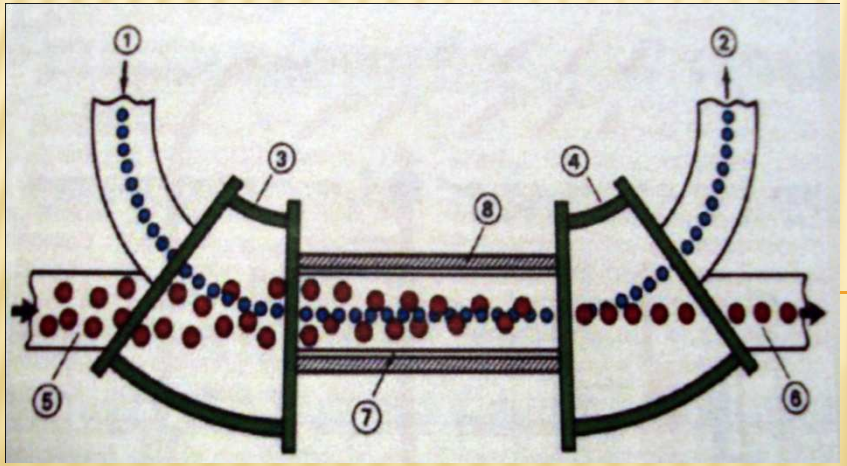
Electron cooling

-High quality electron beam injected into the straight section.

-Electrons velocities spread: 1 / 100 000 of the average.

-Average V(el)=V(pr).

-Electron BeaProton BC.

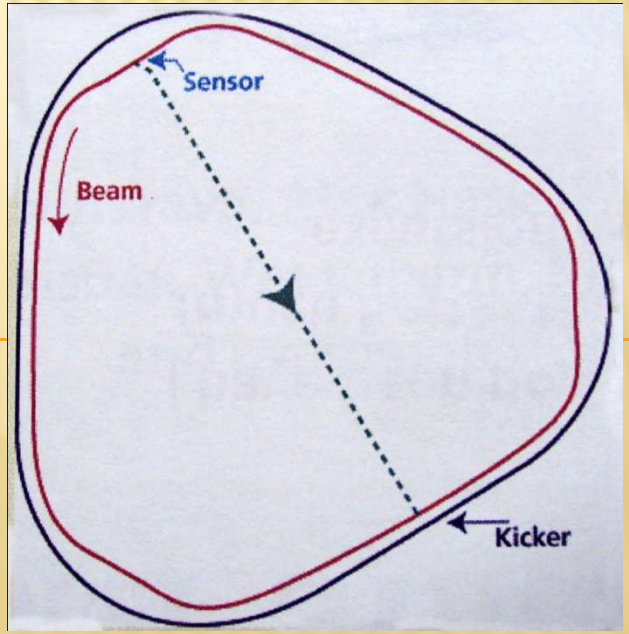


Stochastic cooling

-Sensor: the average positon of circulating Particles with respect to a central orbit.

-Signal proportional to the dispplacement sent to another point.

-Corrective pulse forces the particle to approach the central orbit.



CONCLUSION

Before Visit:

Huge amount of names and definitions, notions.

High level of Confusion ☺

After visit:

My knowledge received some shape .

Received detailed answers of my questions.

Now, I'm happy and more and more interested.

ACKNOWLEDGEMENTs

Prof. Hans Ströher for very kind and supportive attitude, for giving the opportunity to spend 2 weeks in this powerful research centre.

Dr. Detlev Gotta for detailed explanations and kind advices.

Dr. Hubert Gorke for software support and diligent discussions in programming.

Dr. Andro Kacharava for guiding me before, during and probably after visit, for providing me with interesting guides, explanations, for friendly, kind and generous attitude, for giving me strength to fight for victory. simply for everything he did for me...

Dr. Elguja Kutelia and Olga Tsurtsumia for enormous human, technical support.

Dr. Mirian Tabidze for introductory talks before my arrival.

David's for being always ready to help and just being a nice company.

Norbert for kind advices and Labview software tool introduction.

THANK YOU FOR YOUR TIME AND ATTENTION !

SENCERELY, MALKHAZ JABUA

JÜLICH, 29 NOVEMBER, 2010

TBILISI AT NIGHT