

SUMMARY  
FOREIGN TRAVEL TRIP REPORT  
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Date of Trip Report Dates of Trip: 01/31/08 – 02/13/08  
Departure date: 01/31/08  
Arrival date: 02/13/08

Destination(s): Dubna, Russia  
Helsinki, Finland

**Statement of Purpose of Trip:**

Meeting with collaborating groups concerning design and construction of PHENIX Nose Cone Calorimeter. Assembly of a readout module for silicone strip sensor.

**Abstract:**

During this visit we discussed the possibilities and details of building the prototype module of Nose Cone Calorimeter. This prototype would be a full featured module, a one of 14 of calorimeter building blocks.

The main activity for the NCC project at Dubna is shifted from the design of electronic boards to PCB manufacturing and PCB production and to module assembly. Therefore Sergey Basilev is going to step down as a technical coordinator for the JINR group involved in building the NCC. Nikolay Zamiatin agreed to be the new technical coordinator.

The design of all components for pad sensors is finished and accepted, some minor modifications may be required. It was agreed that stuffing of PCBs will be responsibility of BNL.

The stripixel sensors will be replaced by strip sensors. Completely new design required for readout of strip sensors. This design will be prepared by Dubna group.

During my visit one readout module for strip sensors have been assembled at Dubna and this module have been wire bonded at Helsinki.

I had discussion with representatives of Dubna International University of Nature, Society, and Man concerning their possible participation in PHENIX NCC project and we agreed that this collaboration would be very appreciated by both sides.

MINOR REVISION

The departure date was delayed from 01/25/08 to 01/31/08 due to the late approval, and consequently the return date was delayed from 02/10/08 to 02/13/08.

# Trip Report

The purpose of this trip was to meet with our collaborators at Joint Institute for Nuclear Research, Dubna, Russia and at Institute of Physics at Helsinki University, Finland and

- finalize the design of prototype module of Nose Cone Calorimeter (NCC)
- organize assembly of the prototype module
- discuss production of the NCC
- assemble readout module for strip sensors of NCC

The NCC is one of the major upgrades of PHENIX experiment at RHIC which should significantly improve the physics reach of PHENIX. My role was to coordinate joint efforts for building the prototype module and to evaluate the capabilities of collaborating group for future full-scale production.

## Dubna

In Dubna I have visited Laboratory of High Energy and Particle Physics, groups of N. Zamiatin and S. Bazylev.

### *Pad Sensors*

We have accepted the final design and procedure of assembly of pad structured sensors. Design files of all components of readout electronics for pad sensors are ready for manufacturing.

The main activity for the NCC project at Dubna is shifted from the design of electronic boards to PCB manufacturing and to PCB production and to module assembly. Therefore Sergey Basilev is going to step down as a technical coordinator for the JINR group involved in building the NCC. Nikolay Zamiatin agreed to be the new technical coordinator.

The following should be delivered to Zamiatin for assembly of pad sensor modules:

- 1) tungsten plates,
- 2) CARs
- 3) INTCs
- 4) ?? Spacers ??
- 5) Flex cables

With all this in hands his group will assemble the pad sensor modules.

### *Strip Sensors*

First of all we need to test how the SRC will work with sensor mounted on top. That test can be done using the sensor we have at BNL.

Plan:

- Make at least one SRC subassembly (SRC+ceramic+PAs+SVX4s).
- Make hi-tec wire bonding SVX4s-PA and PA-SRC at Helsinki
- Make sensor subassembly (PCB substrate + 2 sensors) at BNL
- Wire bond sensor and SRC subassembly at BNL
- Test with beta-source

- Try to test with alpha source, in that case we need to organize trigger from backplane (we can use our PAMPs for that)

### **Dubna.**

It was agreed that due to the negative tests with stripixel sensors at BNL, for final design we will be using strip sensors instead of stripixels. We have discussed the design and assembly procedure for strip sensors with NZ.

The following was done at Dubna by NZ group in preparation of the readout module for strip sensors:

1. Ceramic substrates were glued using nonconductive epoxy (Araldite) to 5 of SRC boards. The SRC were substantially warped before glueing and we hoped that the ceramic substrate will help to flatten the board. Unfortunately it did not help. The bending is almost the same as it was before glueing. For future we should consider other material, probably BT-material for SRC.
2. Two pitch adapters were glued to each SRC board.
3. The bondability of the pitch adapters was tested and it was acceptable.

### **Helsinki.**

Henri Seppanen made visual inspection of the all components and here are his comments:

1. We should pay great attention to the quality gold plating of bonding pads, some of them have scratches, solder drops and other imperfection. That could be acceptable for manual wire bonding but for production phase more strict quality control is necessary.
2. Attention should be paid to the edge of the bonding pads near the cut line.
3. The handling of the pitch adapter should be more careful. They shows scratches, dirt.
4. Flattness of the SRC is an issue.
5. The dummy capacitors placed for positioning of the PA should be removed.

Henri attached 2 of SVX4-2b chips to one SRC and 2 of SVX4-2a to another SRC using conductive epoxy EPOTEK H20E

<http://www.epotek.com/SSCDocs/datasheets/H20E.PDF>

Henri Seppanen did successfully the wire bonding of SVX4s-PA and PA-SRC for one SRC. at Helsinki.

We were not able to setup the test station due to problem with PCs. In future we better provide turnkey-ready system including the PCs.

Since we were not able to test SRC after the wire bonding then there was no sense for encapsulation. We decided that all electrical test will be done after my return at BNL.

### ***Future activity***

According to current administrative coordinator (A. Litvinenko), the current JINR project for JINR-PHENIX collaboration will not be extended beyond 2008. There is a pressure from JINR administration to abandon projects especially if they are not based on JINR main facilities. Anatoli is trying all possible to open new project for JINR-PHENIX but he is quite pessimistic.

I had discussion with Dr. Nikolay Gorbunov of Dubna International University of Nature, Society , and Man, concerning their possible participation in PHENIX NCC project and we agreed that this collaboration would be very appreciated by both sides.

Dubna University can participate in design, building and data analysis of the NCC. Dr. Nikolay Gorbunov can manage the administrative coordination of the Dubna-PHENIX activity.

## Appendix

### Itinerary:

- January 31, 2008 Depart New York
- February 01 Arrive Moscow, trip to Dubna
- February 2-3 Weekend time
- February 4-8 Work and meetings at JINR, Dubna
- February 08 Dubna-Moscow, depart Moscow, night train to Helsinki
- February 09 Arrive Helsinki
- February 09-11 Work with H. Seppanen at Institute of Physics
- February 11 Depart Helsinki, night train to Moscow
- February 12 Arrive Moscow
- February 13 Depart Moscow, Arrive New York

### ***Persons contacted:***

#### **Institute of Physics, Helsinki University:**

Markku Oinonen,  
Henry Seppanen,  
Jan Rack

#### **Joint Institute for Nuclear Research, Dubna, Russia**

Sergey Bazylev,  
Vjacheslav Slepnev,  
Alexey Baskakov  
Ilya Slepnev

Nikolay Zamiatin  
Nikolay Gorbunov

Anatoly Litvinenko