Strong interaction studies in antiproton annihilation (SISTINA)

- 2018 Annual Summary Document for the ISAB FAIR-RO-

1.1 Group list (physicists, staff, postdocs, students):

Name	**Position**
Alexandru-Mario BRAGADIREANU	Physicist (CS III) – IFIN-HH
Dan PANTEA	Physicist (CS I) – IFIN-HH
Stefan-Alexandru GHINESCU	Physicist – IFIN-HH, PhD *Student (Physics)*,
Ovidiu-Emanuel HUTANU	Engineer - IFIN-HH, *Master Student (Electronics)*
Alina MOTORGA	Project accountant - IFIN-HH

1.2 Specific scientific focus of group (state physics of subfield of focus and group's role);

Physics subfields: QCD bound states, Hypernuclear Physics.

Taking into account the expertise of our group (ATLAS, EXCHARM, FOCUS, DEAR and SIDDHARTA experiments) we expressed our interest in the measurements dedicated to charmonium and exotic states and in the Hypernuclear Physics with emphasis on Ξ^- atoms were our experience in detecting X-rays coming from transitions in Kaonic exotic atoms would be beneficial for PANDA collaboration.

1.3 Summary of accomplishments during the reporting period

Since PANDA is now in the Construction phase our short term objectives were focused on the research and development activities for PANDA STT sub-detector, coordination and integration of PANDA control system(s), PANDA computing.

Accomplishments:

- Development and production of Compute Module I/O Board with 10/100 Ethernet, USB 2.0 and HDMI interfaces version 2.0;
- Development and production of Communication Mezzanine board with RS232, RS485 and CAN-BUS for the Compute Module Board version 2.0;
- Extended Test-bed for the evaluation of PANDA controls database archiving;
- PANDA Controls TDR draft;
- Controls requirements analysis for the STT read-out electronics;
- Software prototype for the Integration of STT readout electronics in the STT control system;

2. Scientific accomplishments (max. 3 pages) – Results obtained during the reporting period.

The Compute Module I/O and the Communication mezzanine boards (fig. 1) designed and assembled in IFIN-HH in 2017 has been updated at version 2.0. The small series production in IFIN-HH-DFPE using a PCB assembly line (Semi-Automatic Stencil Printer, SMD Pick and Place Machine, Reflow Oven) has been defined and first prototype was assembled partially.

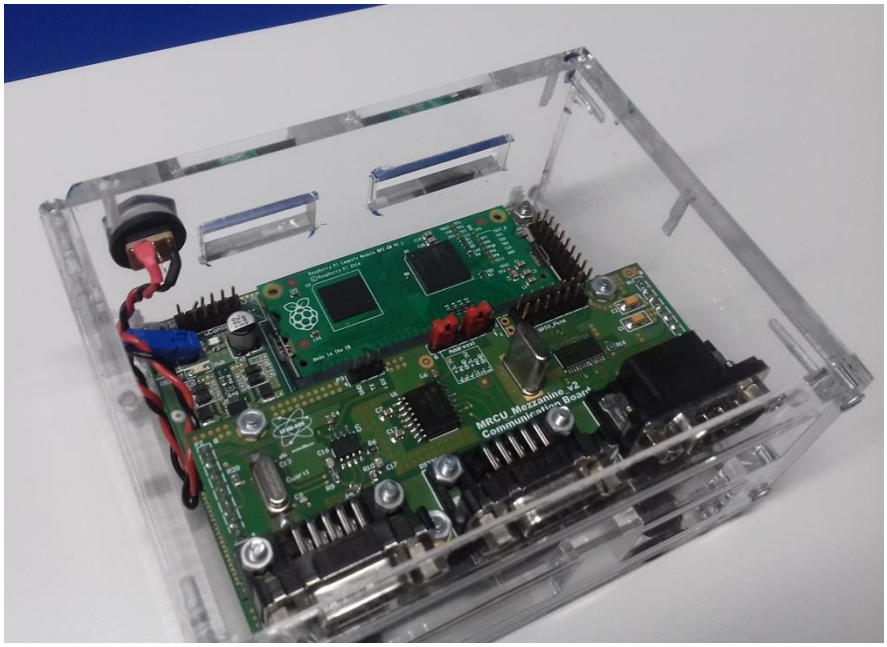

Fig. 1 IFIN-HH Compute Module I/O board with Communication Mezzanine v 2.0

The contents of PANDA Technical Design Report were discussed in various dedicated meetings in 2017, one of the hot subjects being the archiving of process variables – one alternative being the implementation of one archiver machine / PANDA sub-system and a dedicated database cluster at the supervisory level – common for all sub-systems (fig. 2).

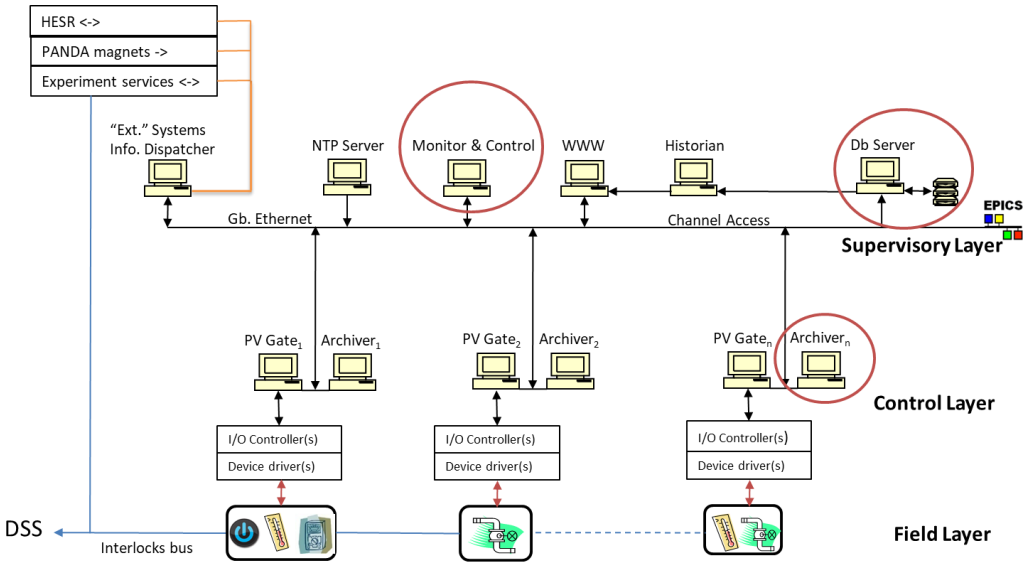

Fig. 2 PANDA Controls Architecture

The test bed for database storage and retrieval developed at the end of 2017 in IFIN-HH – with reused IFIN-HH PANDA grid compute nodes – has been updated at the beginning of 2018, the overall number of reused computers being increased to 16 (Fig. 3).

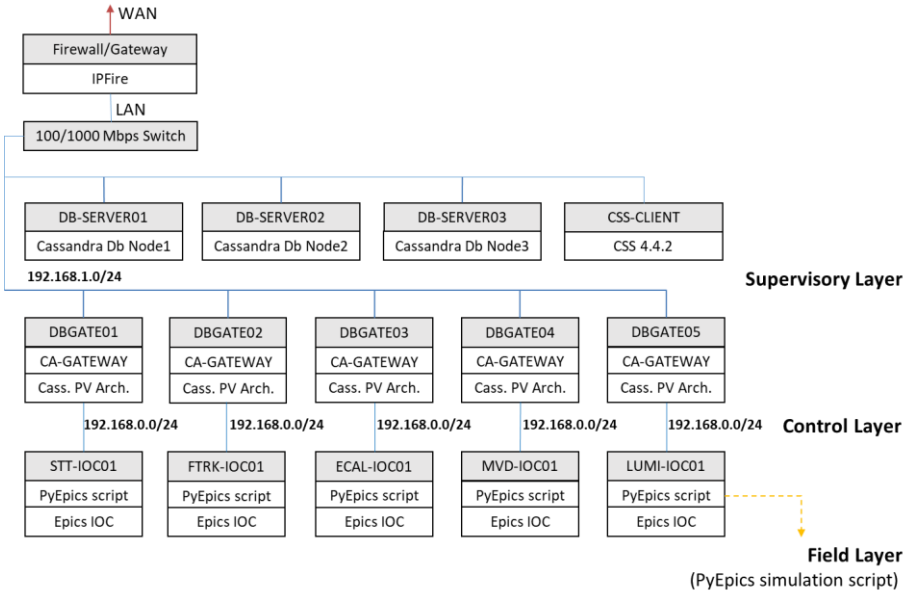

Fig. 3 Process Variables archiving test-bed

The performance of Cassandra PV Archiver deployed on a three node cluster has been evaluated – with a database of 60.010 Process Variables. More details about the testbed features and performance can be found here https://indico.gsi.de/event/6948/.

The integration of PANDA DAQ and FE Electronics in the PANDA Controls software framework is another PANDA hot topic. We developed an application which consists mainly of two software components:

- EPICS IOC Finite State Machine application (fsm) which can be used to send/receive commands/states from/to supervisory layer to/from control field layer;

- Channel Access (CA) client CAcomm which can be used to monitor the CA and trigger different transitions according to the command value does providing an interface between Epics based "Run Control" and DAQ/FEE/DCS devices.

The FSM IOC (fig. 4) creates three process variables (pv): command, state and error. The fsm states are:

READY (state=1); ERROR (state = 2); INITIALIZED (state=3); RUNNING (state=4)

The predefined command values are: 1 triggers the CONFIGURATION process; 2 triggers the RESET; 3 starts the DAQ; 4 stops the DAQ; 0 resets the fsm.

If an error occurs in any of the above transitions (cases) an error string can be communicated to the Run Control via the error pv.

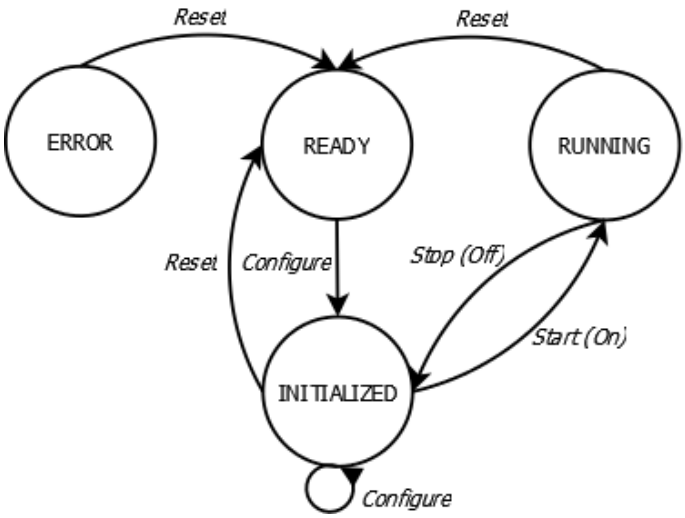

Fig. 4 DAQ-FEE Controls FSM

A git repository of the software application has been created and made available at https://panda-repo.gsi.de/Mario/fsmCAcomm.git.

PANDA Controls TDR has been made available within PANDA Collaboration for internal review at the end of October 2018.

3. Group members (table):

- List each member, his/her role in project and the Full Time Equivalent (FTE) % time in project.

Name	Role	FTE
Alexandru-Mario BRAGADIREANU	Controls Software development, Hardware integration	0.08
Dan PANTEA	PANDA software framework - maintenance and support	0.25
Stefan-Alexandru GHINESCU	Software development	0.25
Ovidiu-Emanuel HUTANU	Electronics hardware design, assembly and testing	0.25
Alina Motorga	Accounting	0.32

- List PhD/Master students and current position/job in the institution.

  Stefan-Alexandru GHINESCU – PhD student;
  Ovidiu-Emanuel HUTANU – Master student.

4. Deliverables in the last year related to the project:

- List of talks of group members (title, conference or meeting, date):

  PANDA PV archiving, Detector Control System Session at CM 18/1, GSI, March 6, 2018

(https://indico.gsi.de/event/6948/)

DCS Configuration, PANDA DCS-DAQ-FEE eZuce Meeting, 26 March 2018
(https://indico.gsi.de/event/7099/)

- Other deliverables (patents, books etc.).

5. Further group activities (max. 1 page):

- Coordination of PANDA DCS – until June 2018;
- Chairing of PANDA DCS group– until June 2018;
- Maintenance of PANDA DCS Wiki page– until June 2018.

6. Financial Report (budget usage) for the reporting period (see the Annex).

7. Research plan and goals for the next year (max. 1 page).

At the last PANDA Collaboration meeting (November 2018) it was decided that the polish designed ASIC should be used for STT – this decision is pending since 2017. For the implementation of the ASIC readout the mechanical integration an cooling are important tasks to be addressed in 2019.

The complete STT control system software is foreseen to be deployed in Q3 of 2019. There is an associated risk of not having at disposal the complete STT gas system due to the freezing of Italy participation in PANDA and consequently the building of STT gas system in due time.

Financial Report 2018

according to the regulations from H.G. 134/2011

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Type of expenditures		2018
1	**PERSONNEL EXPENDITURES**, from which:	**120,984.00**
	1.1. wages and similar income, according to the law	118,322.00
	1.2. contributions related to wages and assimilated incomes	2,662.00
2	**LOGISTICS EXPENDITURES**, from which:	**18,601.80**
	2.1. capital expenditures	14,593.72
	2.2. stocks expenditures	4,008.08
	2.3. expenditures on services performed by third parties, including:	0.00
3	**TRAVEL EXPENDITURES**	**4,421.27**
4	**INDIRECT EXPENDITURES – (OVERHEADS) ***	**56,515.94**
TOTAL EXPENDITURES *(1+2+3+4)*		**200,523.00**

* Specify the rate (%) and key of distribution (excluding capital expenditures).
Indirect Expenditures = General IFIN-HH Overheads (35% from 1+ 2.2 +2.3 +3) + Particle Physics Department Overheads (9.275 % from 1)

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