

Questionnaire concerning realization schedule of the **PANDA Interaction region**,

The questionnaire has two parts.

We request a response time until Mai 10 for questions 1-11, compiled in part 1.

For the rest of the questions, part 2 of the questionnaire, we ask a response until May 30.

The scrutiny group appointed to review the project status and make physics-driven suggestions for a possibly stretched installation schedule towards the full PANDA detector has worked out this questionnaire. This includes an understanding of the current status and progress of the detector as given by all sub-system components.

Please understand the following:

- Depending on the progress you have achieved (with e.g. a TDR as an important turning point where a lot of information is compiled) some of the questions may appear obsolete and some of the answers may appear evident. This may not apply to projects different from yours, so please just briefly explain why your answer may be as it is.
- None of the following questions is intended to question your expertise. On the contrary we trust and rely on your qualified response. If any of the wordings is not to your liking, take our sincere apologies. The questions are meant and designed to scrutinize the progress of PANDA.
- You may not feel like answering all questions because sometimes several questions may touch upon the same issue, as you understand it. In these cases, just indicate briefly where you put the information.
- While some of the questions may be perceived as very demanding by your group, we feel that most information is not different from what you might provide with a TDR, a funding application or the like. If you think that something is not necessary, just say so, perhaps including a short explanation of your views.

Thank you for the cooperation and your valued input to the process needed to consolidate PANDA.

Part 1 (response time May 10)

System name: **Interaction Region**

System manager:

1. Status* of the interaction region (IR):
 - Is the design still under discussion, is it available, approved by the TB?
 - When the final design will be ready?
 - Do you plan writing a technical readiness report?
 - * *Asking the 'status' we ask if the design is finished, if a prototype has been constructed, if tests have been performed, if results are available etc.*
2. Status of the interfaces:
 - to the target source
 - to the target dump
 - to the HESR beam line
3. Status of the bayonet flanges along the target lines
 - is prototype available
 - Is the remote activation tested
 - Is the leakage rate measured
4. Status of the support structures
 - Fixations to the STT
 - Fixations along the beam line
5. Status of the internal target-beam crossing
 - Have you defined the construction method?
 - Have you selected the materials?
 - Have you performed stress calculations?
 - Have you constructed a prototype?
 - Do you consider alternative solutions in case of problems?
6. List the research groups collaborating to realize the IR?
 - Cooperation within PANDA
 - Cooperation within or outside of FAIR
 - Cooperation with industry
7. Where can technical information about the IR be found?
 - IR relevant theses for PANDA
 - IR relevant papers for PANDA
 - Contributions to specialized conferences (e.g. IEEE)

- Availability (e.g. PANDA wiki) of internal (technical) reports (PANDA notes)
8. Have you exploited synergies to achieve the most efficient progress?
- On which level can you envisage synergy with other PANDA/HESR systems in the construction/operation phase?
 - On which level have you sought synergy with other FAIR systems?
9. Are you involved in tasks, which are relevant for other PANDA systems?
- To what level of detail has the IR been made available in the PANDA simulation framework?
 - Have you simulated the effect of the IR on neighboring detectors?
Example: How does the extra material of the IR affect the MVD or EMC performance? What is the forward showering into the GEMs?
 - Have you investigated possible cost and manpower savings if using common types of equipment e.g. flanges, gauges, valves, pumps?
 - Do you engage in the planning of common vacuum systems?
 - How many persons (FTE) are engaged in design tasks for the IR / for other general tasks in PANDA?
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10. Financing of manpower and investments:
- What is the total budgeted amount for the IR:
 - amount (% of needed) money already spent by 1.1.2014
 - amount (% of needed) money available to be spent now
 - amount (% of needed) money secured by firm commitments (define “firm”)
 - amount (% of needed) money applied for at which agency
 - amount (% of needed) money intended to be asked from which agency?
 - possible sources of additional funding needed
 - Please attach a graph of the funding profile (2014-2019).
 - Please attach a graph of the manpower profile (2014-2019).
11. Availability of key components:
- Has the technology of key components for the IR been developed to satisfy your needs?
 - What is the schedule for additional developments?
 - Is there a (at least 1) manufacturer who can deliver?
 - Are you in contact with alternative manufacturers?
 - What may be possible risks of delivery?
 - What may be possible risks of the production quality?
 - What is the delivery agreed upon with the main manufacturer compared to the scheduled use in the project?
 - Do you have fallback solutions in case of delivery failure, or if necessary additional developments will not succeed or will not be finished in time?

Part 2 (response time May 30)

System name: **Interaction Region**

(Sub-)system manager:

12. Give an estimate of the criticality of items from the different fields for the IR using a scale from 0 (simple, solved) to 5 (very critical). Use the additional field to detail and explain if needed.

Vacuum performance	Connections, flanges	Interface to detectors	Prototyping of target cross	Beam focus, beam halo

Explanation: This matrix is intended to locate bottlenecks; e.g. "mechanics" can be an issue, if you have no drawing office available, or if you need to place material in front of other detectors. Your answers to this question will not be sufficient to solve the problem, but will be of great help for us to make suggestions for finding solutions.

13. Timelines of work packages for the IR:

- Please provide the resource-loaded schedule (cf. attached example).
- What are the shortcomings on FTE or other non-invest resources?
- Which time-consuming part could be shortened by distributing work, e.g. to companies (added expenses?)?
- Which time-consuming work package could be accelerated with additional money?

Explanation: Please provide the tables as an attachment. An example for a toy project is attached. If you feel that any of the suggested ways of compiling these tables are too fine or too coarse (e.g. the time bins), please use your project's native granularity!

- Could you envisage a simpler design for day 1 with upgrade later?
- Are synergies realized or potentially available?

14. Technical feasibility of the interaction region:

- Is sufficient lab equipment available for system evaluation?
- Are workshops available for prototype construction?
- Are results available from prototype studies? (Attach key results)
- Do you have drawing capacity available for design?
- Will you be able to construct the IR until 1.1.2018? (or until when?)
 - Which companies are involved?
 - Which research labs are involved?
- What is the manpower available for the commissioning in 2018?

15. Is the integration with neighboring and central/common systems settled?
- Do you have collected the complete table of required services?
 - Is the mounting sequence agreed upon with the detector systems?
 - How do you intend to mount the IR?
 - Tightening of the flanges
 - Alignment of the target line and the beam line
 - Checking for vacuum tightness
 - Does the IR require environmental control (vibrations, temperature, humidity) and at what precision? Have you discussed these prerequisites with the TB, the Technical Management, the neighboring systems?

16. Do you see an option for simplification of the IR on day-1 and a later upgrade?

- Which?
- What would be the expected savings in finances?
- What are the expected consequences for manpower needs?
- What would be the expected consequences
 - in vacuum performance?
 - in beam/focus performance?
 - in luminosity performance?
- What would be the expected penalty for physics output?

17. Risk assessment:

- When were possible risks signaled?
- Which of the risks may prevent a completion before 2018?
- Which measures were already taken to counteract possible risks?
- *Example: explore alternative manufacturer.*
- Which additional measures are envisaged?
Example: alternative material concept.

Explanation: We will make use of risk tables collected by the Technical Management. However, the input here may serve to judge the situation of a particular sub-system as a whole. We need to see the status of the risk evaluation and whether counter-measures have already been initiated.