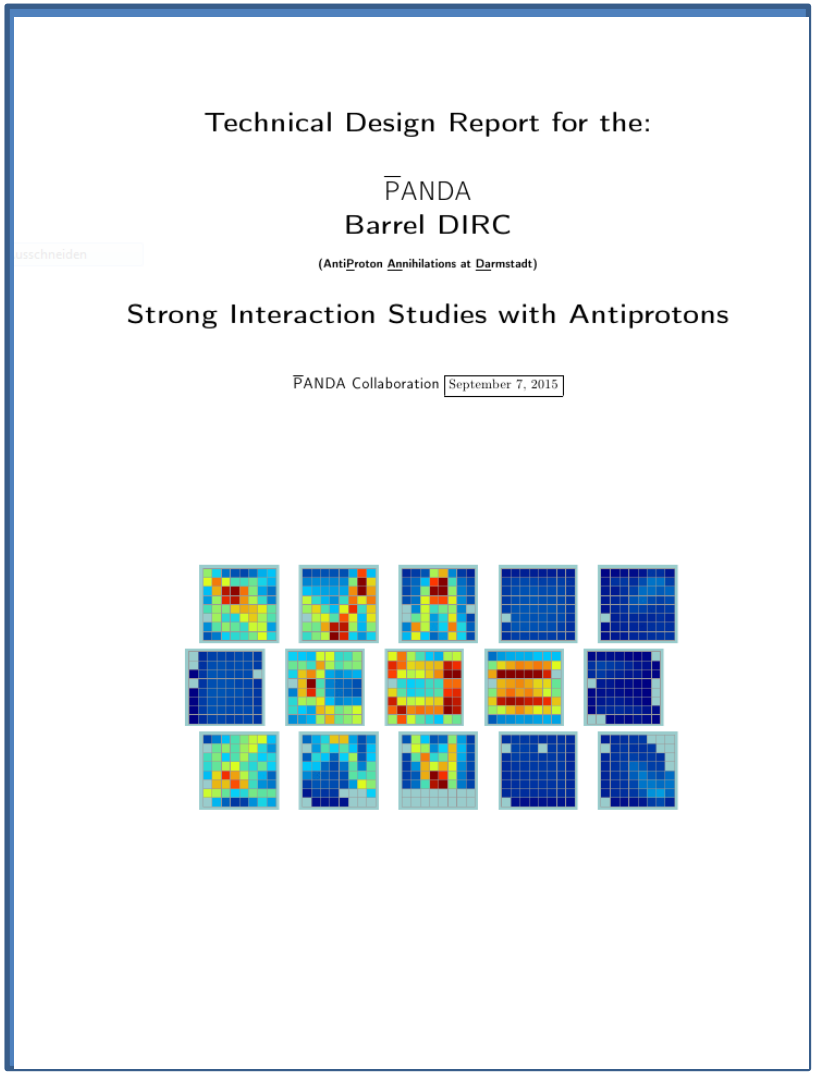
Towards the PANDA Barrel DIRC TDR


Technical Design Report for the:

$\overline{\text{P}}$ANDA
Barrel DIRC

(AntiProton Annihilations at Darmstadt)

Strong Interaction Studies with Antiprotons

$\overline{\text{P}}$ANDA Collaboration September 7, 2015

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- **Responsibilities**
- **Repository**
- **Timeline**

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- **Design of the Barrel DIRC**
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- **Mechanics and Integration**
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- **Project Management**

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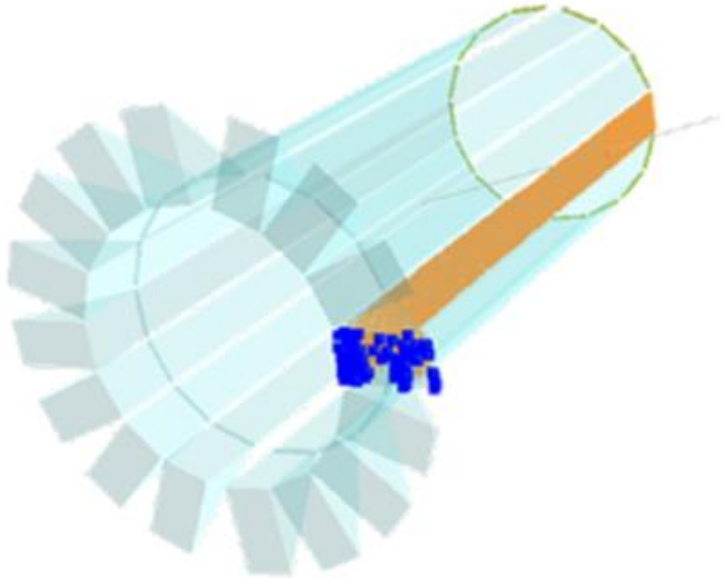

Figure 3.3: Barrel DIRC design 1:Optical elements, i.e. radiator plates, focussing lens and prism shaped expansion volume. The example of a particle track is shown with a pixelized pattern of the photon hits on the sensor plane.

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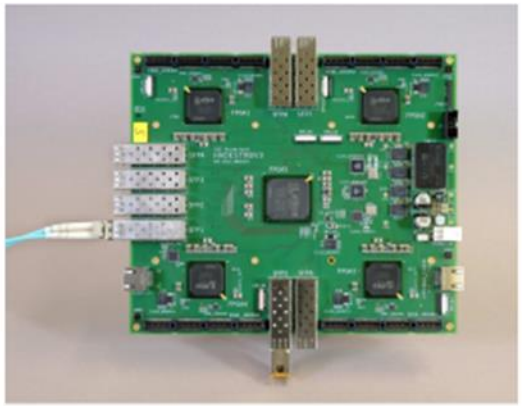
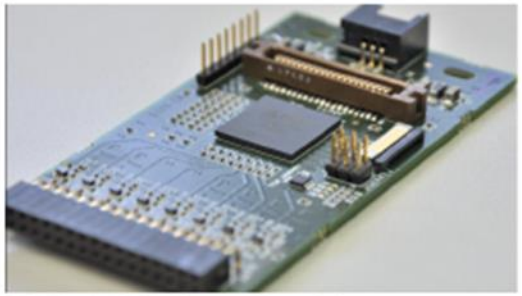


(a) The TRB3 is equipped with a central FPGA and four peripheral FPGAs in the edges. Source: [6]



(b) The PaDiWa front-end boards have connectors to directly connect them with the photon sensors.

Figure 4.2: TRB3 readout electronics.

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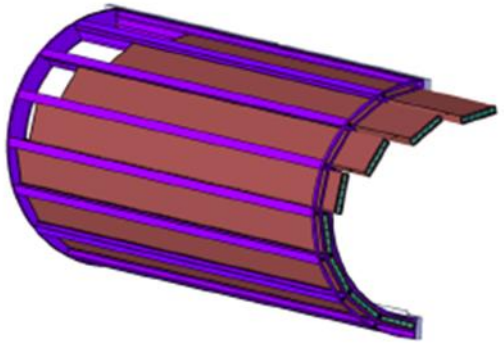

Figure 5.3: Slots for the bar-boxes

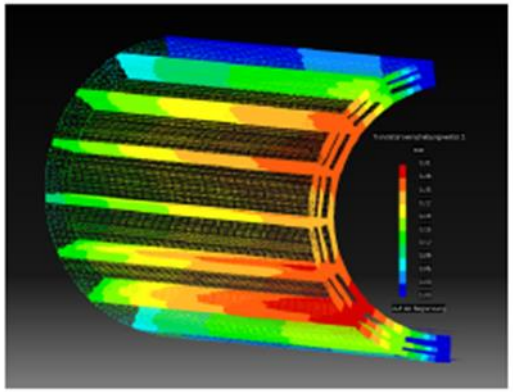

Figure 5.8: FEM analysis of the Barrel DIRC support structure. The values used for the wall thicknesses are written in the text.

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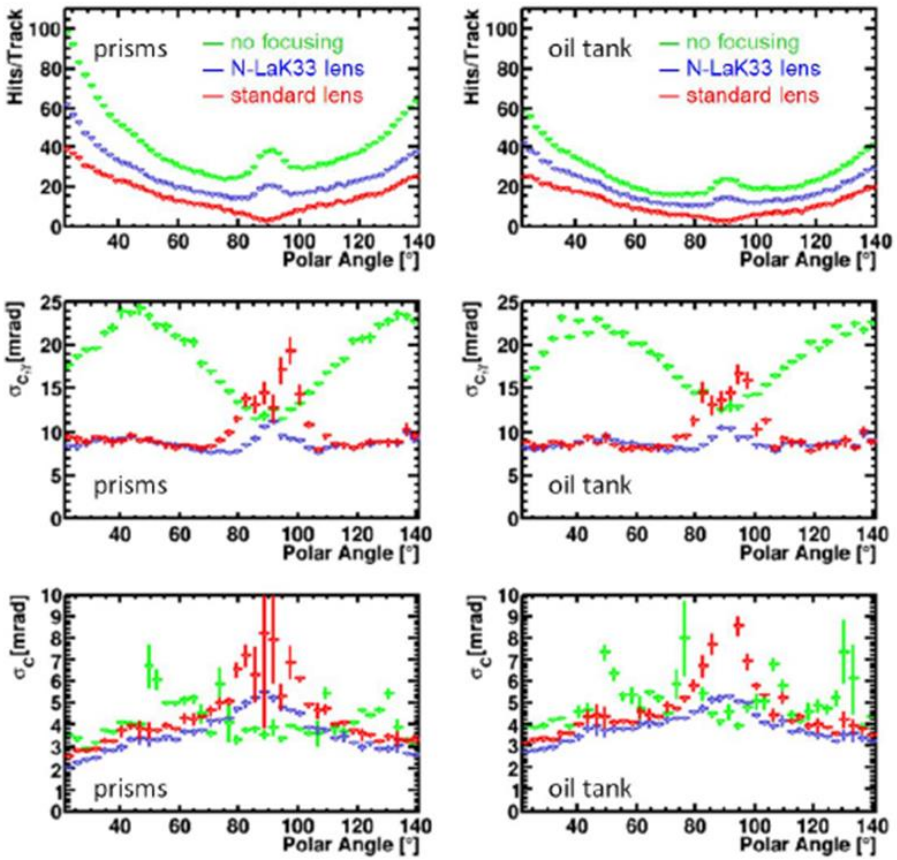

Figure 6.3: Reconstruction results for simulated 3.5 GeV/c muons for narrow bars in two EV configurations: compact prisms (left column) and oil tank (right column). The photon yield (top), single photon resolution (middle), and track Cherenkov angle resolution (bottom) are presented as a function of the polar angle for three focusing options. Results for the high-refractive index N-LaK33 lens without an air gap are shown in blue, for a standard lens with air gap in red. The configuration without focusing, where the bar is coupled directly to the prism, is shown in green.

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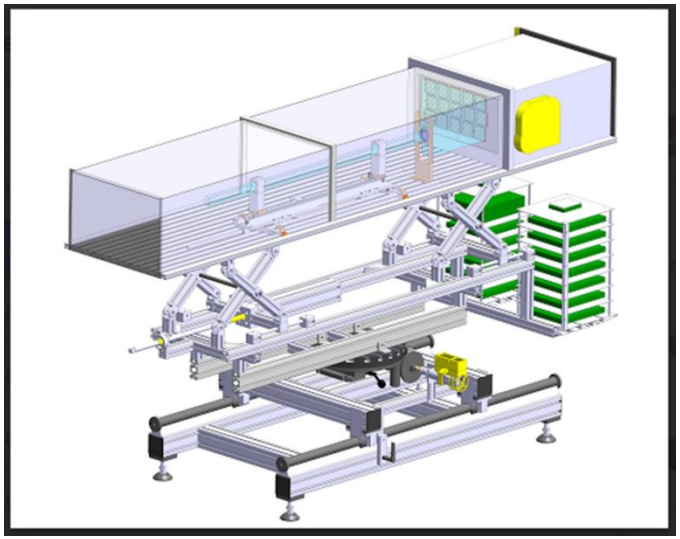

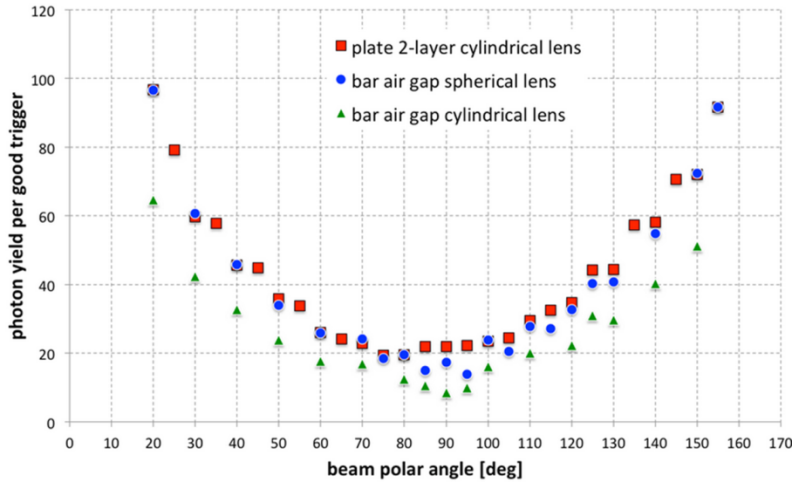

R. Dzhygadlo[1], A. Gerhardt[1], K. Götzen[1], G. Kalicy[1], M. Krebs[1], H. Kumawat[1], D. Lehmann[1], M. Patsyuk[1], K. Peters[1], G. Schepers[1], L. Schmitt[1], C. Schwarz[1], J. Schwiening[1], M. Traxler[1], M. Zühlsdorf[1], V. Kh. Dodokhov[2], A. Britting[3], W. Eyrich[3], A. Lehmann[3], F. Uhlig[3], M. Düren[4], E. Etzelmüller[4], K. Föhl[4], A. Hayrapetyan[4], B. Kröck[4], O. Merle[4], J. Rieke[4], E. Cowie[5], T. Keri[5], R. Montgomery[5], P. Achenbach[6], M. Cardinali[6], M. Hoek[6], W. Lauth[6], S. Schlimme[6], C. Sfienti[6], M. Thiel[6], P. Bühler[7], L. Gruber[7], J. Marton[7], K. Suzuki[7]

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Deputy:	Diego Bettoni	Email: bettoni@fe.infn.it

Responsibilities II

Directory	File	Responsible Person / Author	Status
executive	executive/executive_summary.tex	Georg	
introduction	introduction.tex	Georg	
	introduction_physics_case.tex	Georg	
	introduction_benchmark_channels.tex	Maria, Roman	
	introduction_hesr.tex	Georg	
	introduction_panda_detector.tex	Georg	
	introduction_pid_in_panda.tex	Georg	
goals and requirements	goalsandreqs.tex	Georg	
	goalsandreqs_goals.tex	Georg	
	goalsandreqs_requirements.tex	Georg	
	goalsandreqs_barrel_dirc.tex	Georg	
	goalsandreqs_interferences.tex	Georg	
design	design.tex	Georg	
	designbarrel.tex	Georg	
	designbarrel_mechanical.tex	Georg	
	designbarrel_optical.tex	Georg	
	designbarrel_image_reconstruction.tex	Georg	
	designbarrel_readout_electronics.tex	Georg	

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components	components.tex	Georg	
components radiators	componentsradiators.tex	Georg	
	componentsradiators_materials.tex	Georg	
	componentsradiators_barrel_dirc.tex	Georg	
	componentsradiators_focussing_issues.tex	Carsten	
components photonsensors	componentsphotonsensors.tex	Albert	
	componentsphotonsensors_requirements.tex	Albert	
	componentsphotonsensors_multi_anode_pmts.tex	Albert	
	to be continued here		
components electronics	componentselectronics.tex	Carsten/Michael	
	componentselectronics_signal_readout.tex	Carsten/Michael	
	componentselectronics_lv_hv.tex	Carsten/Michael	
	componentselectronics_slowcontrol_monitoring.tex	Carsten/Michael	
	componentselectronics_calibration.tex	Carsten/Michael	
components mechanical	componentsmechanical.tex		
	componentsmechanical_radiator_containers.tex	Carsten/Andreas	
	componentsmechanical_mechanical_support.tex	Carsten/Andreas	
	componentsmechanical_cabling_and_supplies.tex	Carsten/Andreas	
	componentsmechanical_integration.tex	Carsten/Andreas	
assembly	assembly.tex	Carsten/Andreas	
	assembly_mounting_procedure.tex	Carsten/Andreas	
	assembly_operating_procedures.tex	Carsten/Andreas	
	assembly_maintenance.tex	Carsten/Andreas	

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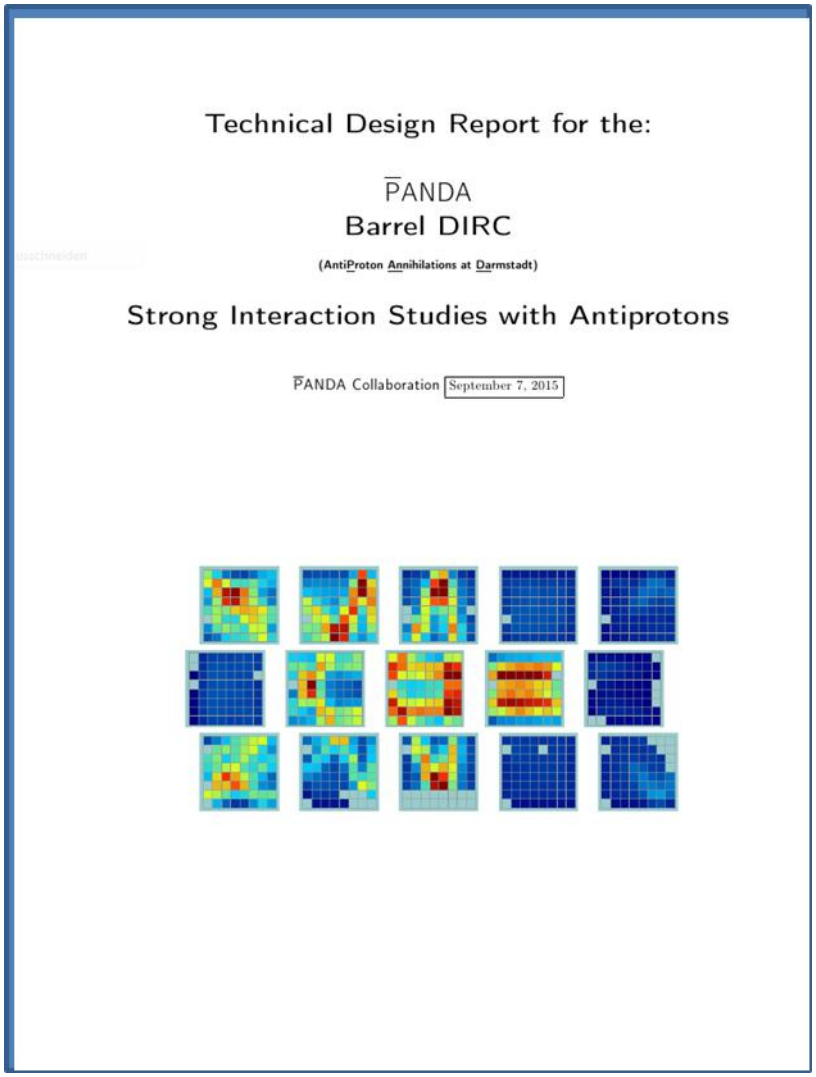
Directory	File	Responsible Person / Author	Status
performance	performance.tex	Roman, Maria	
	performance_simulation.tex	Roman, Maria	
	performance_reconstruction.tex	Roman, Maria	
	performance_detector_resolution.tex	Roman, Maria	
	performance_pid_benchmark_channels.tex	Roman, Maria	
organization	organisation.tex	Georg	
	organisation_quality_assurance.tex	Georg	
	organisation_safety.tex	Georg	
	organisation_assembly_and_installation.tex	Georg	
	organisation_collaboration_structure.tex	Georg	
	organisation_schedule_and_cost.tex	Georg	

- **First Steps:** Only the first time: checkout with
  - svn checkout svn+ssh://charme@lx-pool.gsi.de/u/charme/svn/tdr-cherenkov
  - You find two directories
    - trunk (working directory)
    - tags (holds later named snapshots)
  - Work is done in trunk
    - editing files
    - adding files (later do a svn add filename)
    - removing files by svn remove filename
    - at end
      - svn commit -m "what I have done string"
- **Normal working cycle:**
  - in directory pid-tag/trunk
  - svn update (get changes from other people)
  - work
  - svn commit (upload changes to repository)

PANDA Barrel DIRC TDR in 2016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accepted by PANDA	**March 2016**
int. or ext. reviewers - all tests done	**Jan 2016**
Results of beamtimes	**Dec 2015**
First full document	**Dec 2015**
First draft to Ch-Group	**Sept 2015**
Collection of input	**April 2015**

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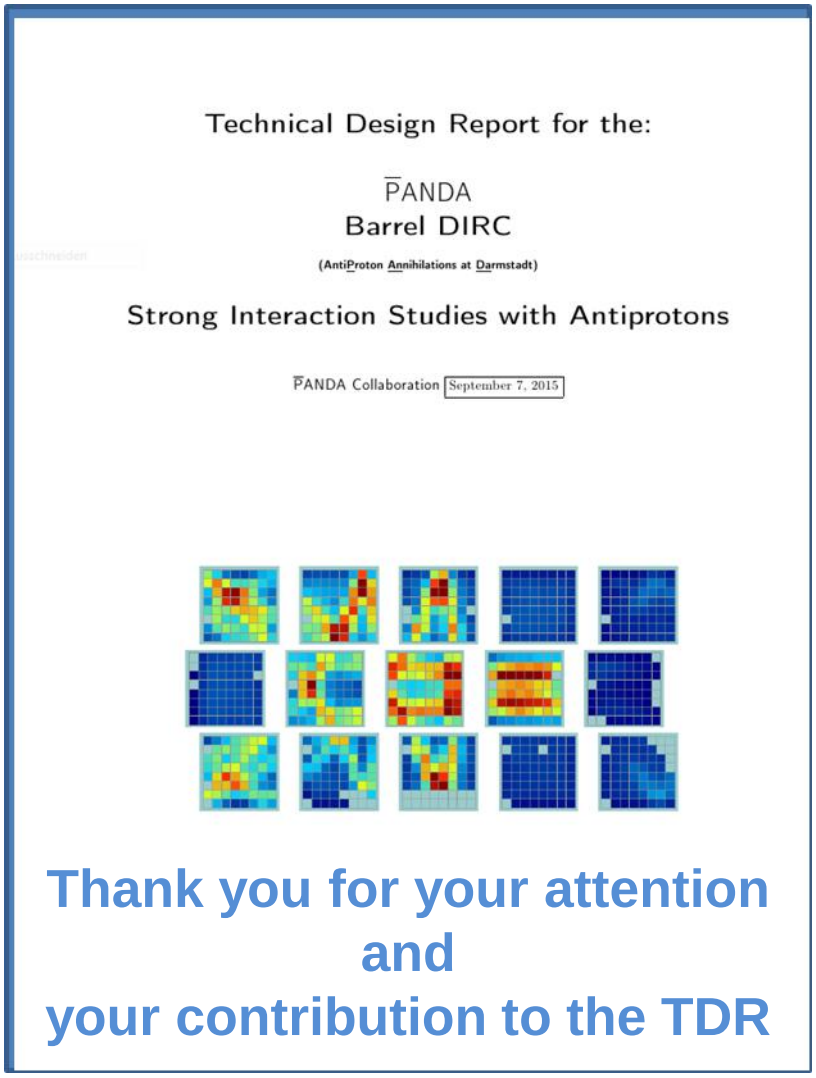
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Thank you for your attention and your contribution to the TDR

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