

# Focussing Disc DIRC – TDR Draft

**Matthias Hoek**

**NPE**

**University of Glasgow**



## Glasgow TDR Draft – General Proposal

- ▶ Endcap Disc DIRC TDR is a collaborative effort
  - ▶ All groups need to be involved
- ▶ Glasgow needs to provide a TDR at the end of current R&D grant
  - ▶ ready by early 2011
  - ▶ identify common parts
- ▶ Propose structure as template for general PANDA Endcap Disc DIRC TDR
  - ▶ Drafting using the GSI Wiki?
  - ▶ Publish on JINST

## Glasgow TDR Draft – General Outline

- ▶ Introduction
- ▶ Requirements by PANDA
  - ▶ Physics
  - ▶ Integration
- ▶ Detector Design & Construction
  - ▶ Imaging
  - ▶ Reconstruction
  - ▶ Housing & Support
- ▶ R&D Efforts and Proof-Of-Principles
  - ▶ Material & Components Selection
  - ▶ Assembly Procedures
- ▶ Quality Assurance
- ▶ Expected Detector Performance

## TDR Outline – Detailed Structure

### Contents

<b>1. Introduction</b>	<b>2</b>		
1.1 Benchmark channels	3		
1.2 Particles Identification in the central spectrometer	3		
1.2.1 PID by DIRC detectors	3		
1.2.2 Particle Identification by EMC	4		
1.3 Particle identification in the far-forward region	4		
1.4 The role of the forward disc DIRC	4		
<b>2. Requirements by PANDA</b>	<b>4</b>		
2.1 Construction space	4		
2.2 Performance in magnetic fields	4		
2.3 Radiation environment	4		
2.4 Expected particle rates	5		
<b>3. Detection of Internally Reflected Cherenkov light</b>	<b>5</b>		
3.1 Conditions for the creation of Cherenkov light	5		
3.2 Conditions for the transport of Cherenkov light	5		
3.3 Reconstruction of the Cherenkov image	5		
<b>4. Design of the PANDA focussing disc DIRC</b>	<b>5</b>		
4.1 Photon creation	5		
4.2 Photon transport	5		
4.3 Photon detection	5		
4.4 Photon imaging	5		
<b>5. Construction of the PANDA focussing disc DIRC</b>	<b>5</b>		
5.1 Construction of the radiator disc	5		
5.2 Construction of the imaging system	5		
5.3 Photon detection and read-out	5		
5.4 Cherenkov image reconstruction and particle identification	5		
<b>6. Laboratory tests and prototyping</b>	<b>5</b>		
6.1 Construction of the radiator	5		
6.1.1 Transmission properties	7		
6.1.2 Radiation hardness	7		
6.1.3 Radiator surface quality	7		
6.1.4 Radiator edge quality	7		
6.1.5 Glue joints	7		
6.1.6 Quality assurance procedure	7		
6.2 Construction of the imaging system	7		
		6.2.1 Test of the focussing properties	7
		6.2.2 Test of the focussing properties	7
		6.2.3 Test of the dispersion mitigation	7
		6.2.4 Overall performance	7
		6.2.5 Quality assurance procedure	7
		<b>6.3 Photon detection</b>	<b>7</b>
		6.3.1 Test photon detection candidate systems	7
		6.3.2 Gain performance	7
		6.3.3 Timing performance	7
		6.3.4 Rate stability	7
		<b>6.4 Read-out system</b>	<b>7</b>
		<b>6.5 Construction of the detector prototype</b>	<b>7</b>
		6.5.1 Establishing the number of created Cherenkov photons	7
		6.5.2 Performance of the optical system	7
		6.5.3 Performance of the photon detection system	7
		6.5.4 Cherenkov image reconstruction	7
		<b>7. Expected physics performance</b>	<b>7</b>
		<b>8. Conclusion</b>	<b>7</b>

## TDR Outline – Detailed Structure

### 6. Laboratory tests and prototyping

#### 6.1 Construction of the radiator

6.1.1 Transmission properties

6.1.2 Radiation hardness

6.1.3 Radiator surface quality

6.1.4 Radiator edge quality

6.1.5 Glue joints

6.1.6 Quality assurance procedure

#### 6.2 Construction of the imaging system

6.2.1 Test of the focussing properties

6.2.2 Test of the focussing properties

6.2.3 Test of the dispersion mitigation

6.2.4 Overall performance

6.2.5 Quality assurance procedure

#### 6.3 Photon detection

6.3.1 Test photon detection candidate systems

6.3.2 Gain performance

6.3.3 Timing performance

6.3.4 Rate stability

#### 6.4 Read-out system

#### 6.5 Construction of the detector prototype

6.5.1 Establishing the number of created Cherenkov photons

6.5.2 Performance of the optical system

6.5.3 Performance of the photon detection system

6.5.4 Cherenkov image reconstruction

- ▶ Structure of TDR established
  - ▶ Quite high level of detail
  - ▶ Open for scrutinising by PID group (if requested)
  - ▶ Comments and improvements welcome