

Determination of the target asymmetry T in η' photoproduction

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DRAFT

I hereby declare that this thesis was formulated by myself and that no sources or tools other than those cited were used.

Bonn,
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.....
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- 1. Gutachter: JUN. PROF. DR. ANNIKA THIEL
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Introduction

This chapter will give a brief introduction into the theoretical concepts that motivate this work. First the Standard Model of Particle Physics is sketched along with characteristics of the strong interaction. Next, the photoproduction of mesons and the importance of polarization observables is explained. Lastly the particular motivation and structure of this work will be presented.

1.1 The Standard Model of Particle Physics

The *Standard Model of Particle Physics* (SM) is believed to describe the fundamental particles and forces of the universe. It distinguishes between *fermions* and *bosons*. While matter consists of fermions, bosons are particles that mediate the fundamental interactions.

Fermions themselves are again grouped into (anti-)quarks and (anti-)leptons. There are three generations of quarks and leptons. Of these only the first and lightest consists of stable particles, i.e. the up and down quark as well as the electron and its neutrino. All other particles are heavier and not stable, they will thus decay fast via the strong, electromagnetic or weak interaction. A summary of properties of quarks and leptons is shown in table 1.1.

	1st	2nd	3rd	el. charge	color charge
Quarks	u	c	t	2/3	r,g,b
	d	s	b	1/3	r,g,b
Leptons	e	μ	τ	-1	-
	ν_e	ν_μ	ν_τ	0	-

Table 1.1: Summary of the particles of the SM

In total, four interactions are part of the SM: strong, electromagnetic, weak and gravitational interaction¹. In particle physics gravitation can be neglected. Strong, electromagnetic and weak interaction are transmitted by gluons g , photons γ and W/Z -bosons respectively. Strong and weak interaction are restricted to a finite range of the order of the nucleon radius, whereas electromagnetic interaction and gravitation have infinite range. A summary of the SM can be found in table 1.2.

¹ they are ordered here according to their relative strength

interaction	couples to	Gauge boson
strong	color	g
electromagnetic	electric charge	γ
weak	weak charge	W^\pm, Z^0

Table 1.2: Summary of the interactions of the SM

1.2 Photoproduction of Pseudoscalar Mesons

$$\int_0^\infty \frac{\sin \alpha \beta x}{\gamma x}$$

1.3 Polarization Obervables and the Complete Experiment

bla

1.4 Motivation and Structure of this Thesis

bla

Experimental Setup

Here comes the very good text.

2.1 Overview of the CBELSA/TAPS experiment

2.2 Production of (polarized) high energy photon beam

2.3 Beam Target

2.4 Calorimeters

2.5 Trigger

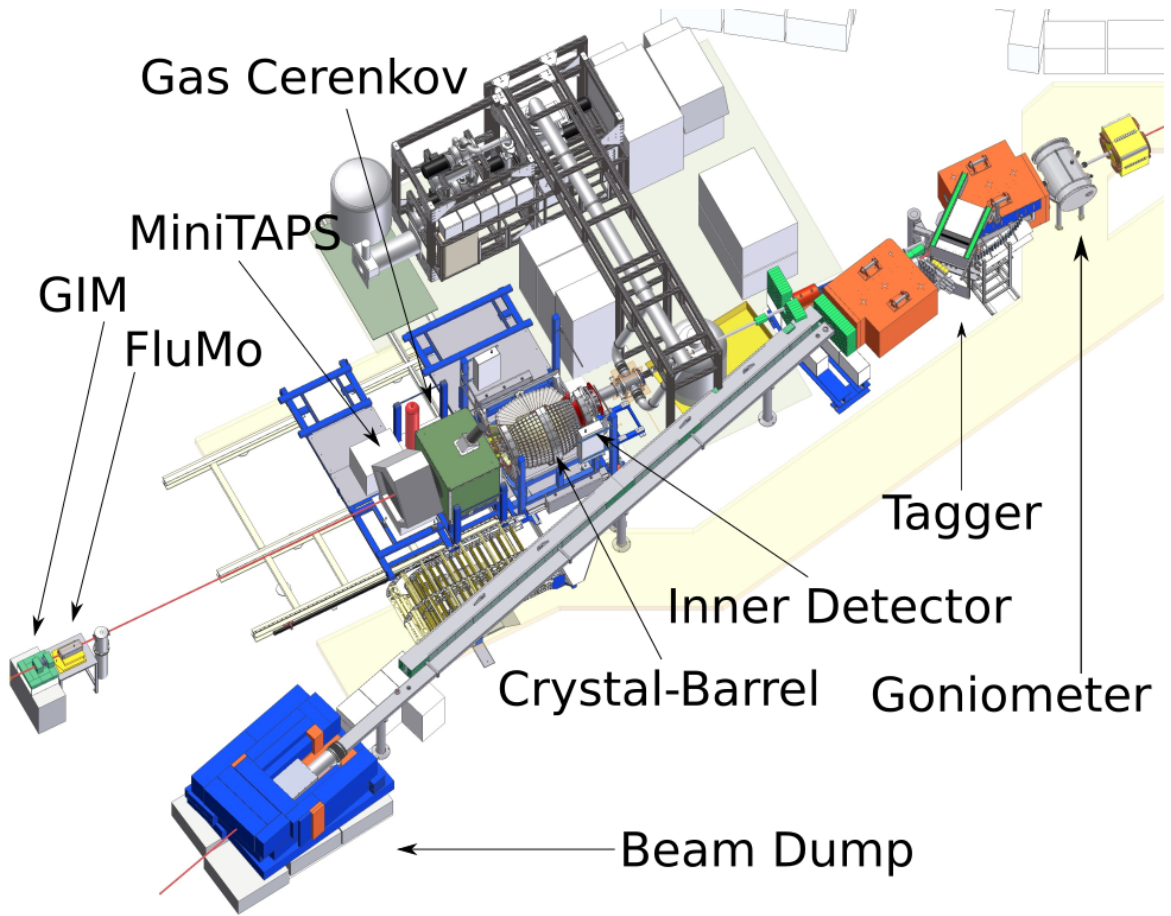


Figure 2.1: Overview of the CBELSA/TAPS experiment [Wal]

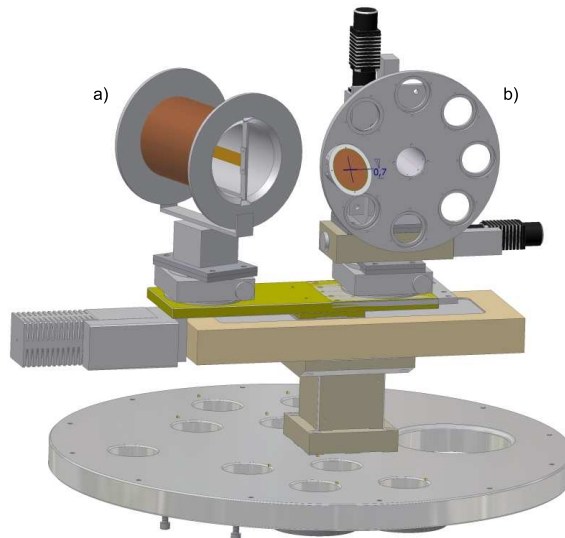


Figure 2.2: [Wal]

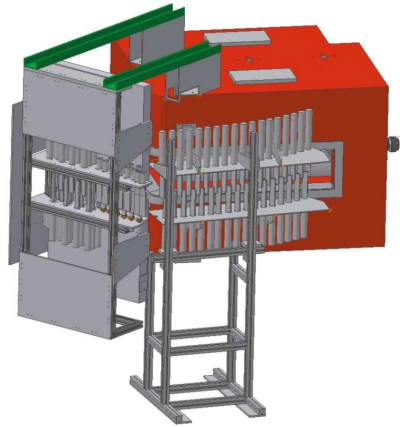


Figure 2.3: [Wal]



Figure 2.4: [Wal]

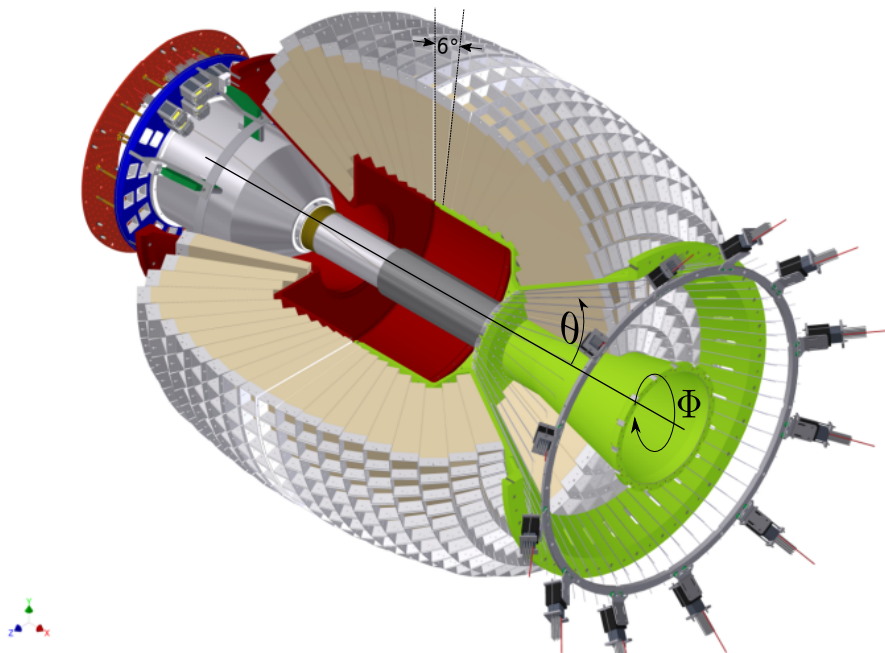


Figure 2.5: D. WALTHER in [Urb17]

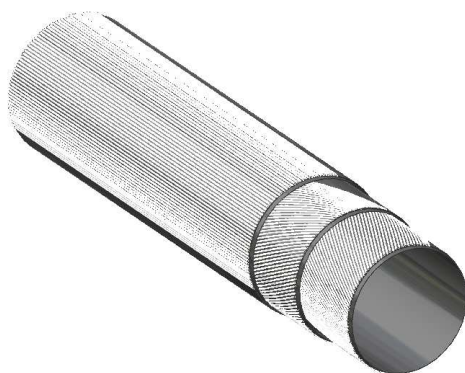


Figure 2.6: [Wal]

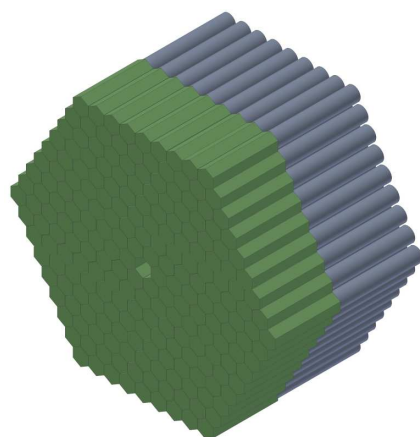


Figure 2.7: [Wal]

Useful information

In the appendix you usually include extra information that should be documented in your thesis, but not interrupt the flow.

The L^AT_EX WikiBook [[latexwiki](#)] is a useful source of information on L^AT_EX.

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