RCs

October 9, 2013

Abstract

Radiative are performed on the sane experiment to obtain the A1 and A2. Internal radiative corrections are calculated in polarization dependent way, while the external radiative corrections are calculated following the procedure of Mo and Tsai.

1 Introduction

2 Overview

The measured asymmetry includes external effects due to target thickness in addition to the internal radiative corrections.

The experimental asymmetry is

$$A^{r+t} = \frac{\sigma_{+}^{r+t} - \sigma_{-}^{r+t}}{\sigma_{+}^{r+t} + \sigma_{-}^{r+t}} \tag{1}$$

where $r+t$ denotes cross sections with internal (r) and external (t) radiation.

3 Background Contamination

The background from π^0 decays producing electron and positron pairs.

4 Subtracting Elastic Tail

First we want to get the inelastic radiated asymmetry from the total asymmetry.

$$A_{Exp} = \frac{\Delta_{r+t}^{total}}{\Sigma_{r+t}^{total}} = \frac{\Delta_{r+t}^{in} + \Delta_{r+t}^{el}}{\Sigma_{r+t}^{in} + \Sigma_{r+t}^{el}} \tag{2}$$

where A_{Exp} is the measured radiated asymmetry, the Δs are polarized cross section differences and Σs are unpolarized cross sections. The subscript denotes

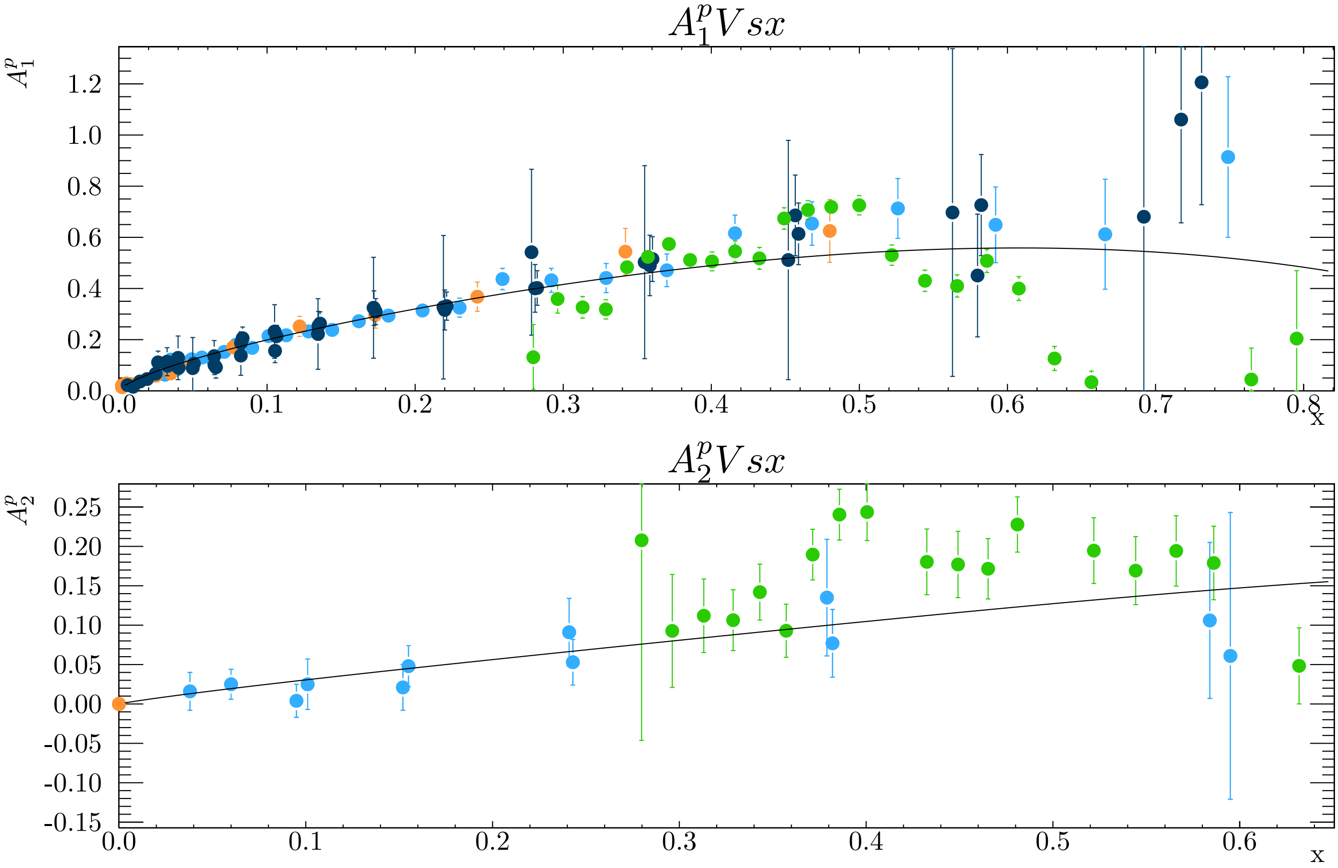

Figure 1: Image (`A1p.tex`) generated thanks to `TTeXDump`

inelastic or elastic processes. The born asymmetry is calculated as

$$A_{in} = \frac{\Delta_{in}}{\Sigma_{in}} \tag{3}$$

$$= \frac{\Delta_T - \Delta_{el}}{\Sigma_{in}} \tag{4}$$

$$= \frac{\Sigma_T A_{Exp} - \Delta_{el}}{\Sigma_{in}} \tag{5}$$

$$= \frac{1}{f_{el}} A_{Exp} - C_{el} \tag{6}$$

where

$$\frac{1}{f_{el}} = \frac{\Sigma_T}{\Sigma_{in}} \tag{7}$$

and

$$C_{el} = \frac{\Delta_{el}}{\Sigma_{in}} \tag{8}$$

In order to subtract the elastic tail we need the fully radiated cross section difference Δ_{el}, and the ratiated cross section sums Σ_{in} and Σ_{el}

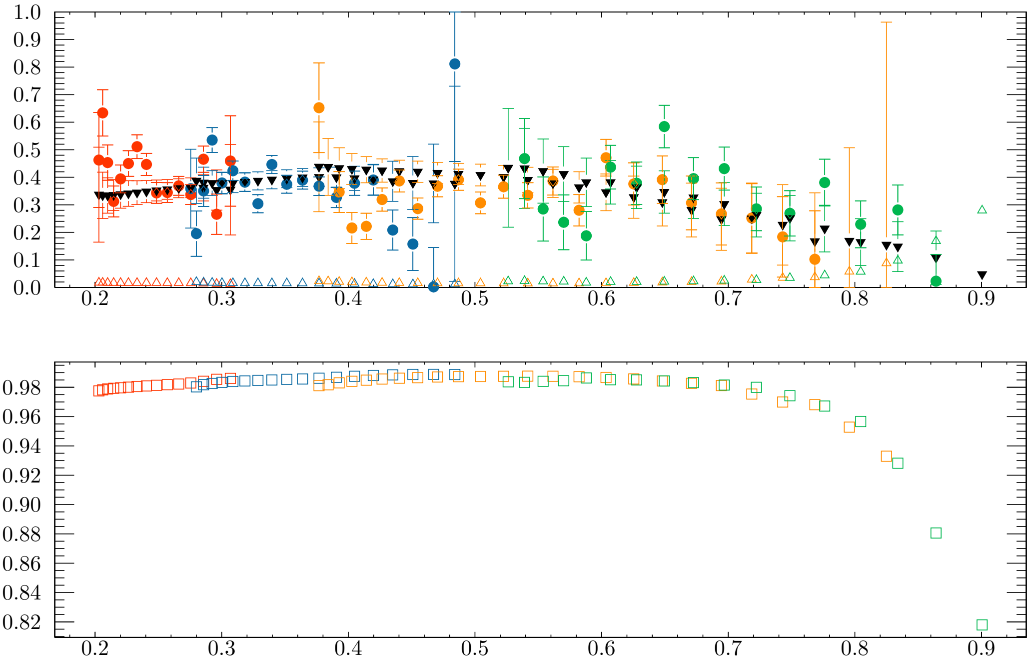

Figure 2: Image (`A1p.tex`) generated thanks to `TTeXDump`

5 Calculating the Radiative Tails

5.1 Elastic Radiative Tail

Mo and Tsai do not provide a way of calculating the polarized elastic radiative tail, however, it does provide a method for calculating the external radiative tail, which we treat as an unpolarized effect. The polarized elastic radiative tail, σ_r^{ERT} calculated using the formalism of [**?**]. Using the born level, polarized elastic cross section, the external component of the radiative tail, σ_t^{ERT}, is calculated following equation A.16 of Mo and Tsai. The totally radiated elastic radiative tail is then simply

$$\sigma_{t+r}^{ERT}(E_s, E_p, T/2) = \sigma_t^{ERT}(E_s, E_p, T/2) + \sigma_r^{ERT}(E_s, E_p). \tag{9}$$

5.2 Inelastic Radiative Tail

Following equation A.22 of Mo and Tsai [**?**], the inelastic external radiative corrections to the interanlly radiated cross section difference (or sum) can be written using the "strip" approximation as

$$\begin{aligned}\Delta\sigma_{t+r}(E_s, E_p, T/2) = \\ & e^{\delta_s+\delta_p}\Delta\sigma_r(E_s, E_p, T/2) \\ & + e^{\delta_s/2}\int_{E_{smin(E_p)}}^{E_s-\Delta}\{1 - D(E_s, E_s', Z)\}\, I_e(E_s, E_s', T/2)\Delta\sigma_r(E_s', E_p, T/2)dE_s' \\ & + e^{\delta_p/2}\int_{E_p+\Delta}^{E_{pmax(E_s)}} I_e(E_p', E_p, T/2)\Delta\sigma_r(E_s, E_p', T/2)dE_p'.\end{aligned}$$

6 Iterative Procedure

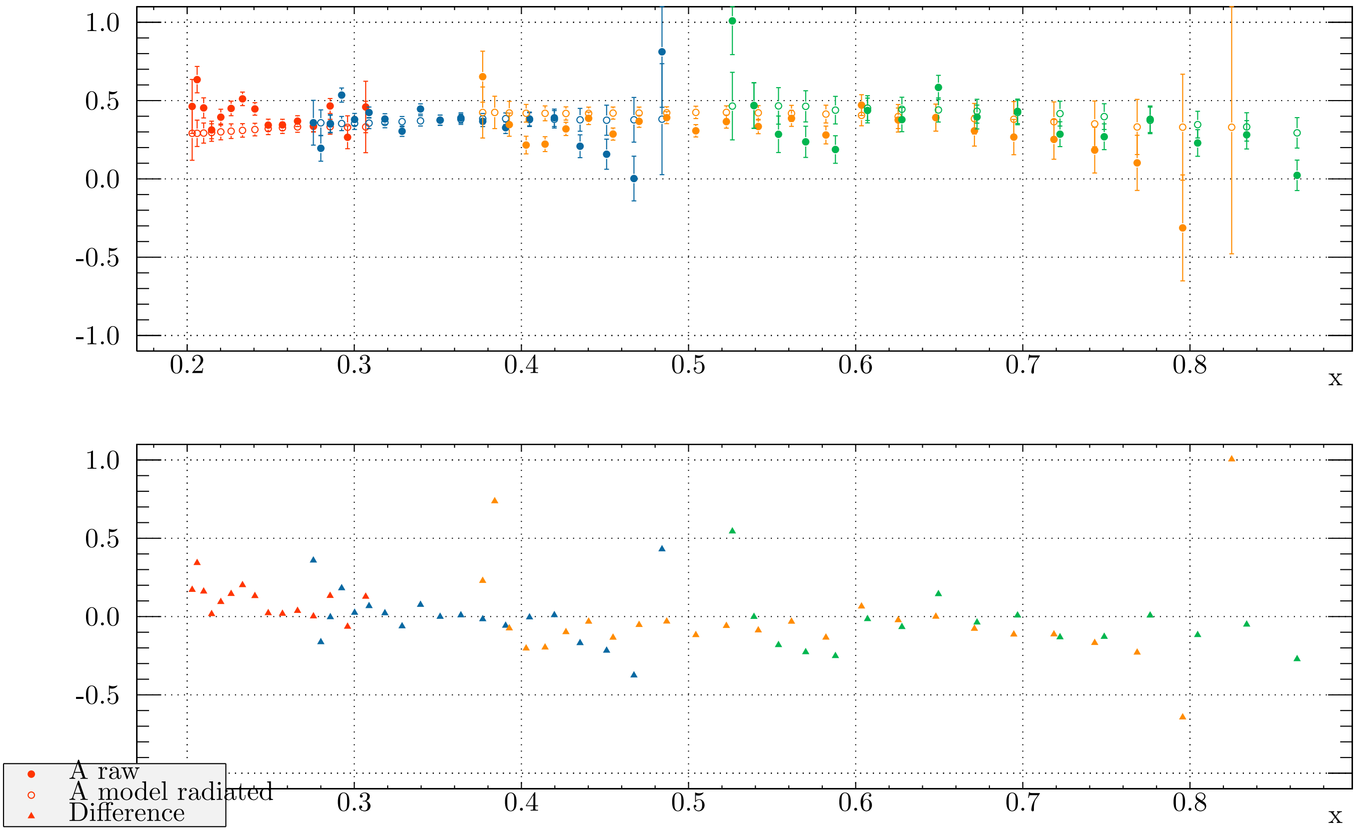

Figure 3: Image (`A1p.tex`) generated thanks to `TTeXDump`