Data Quality of LPOL Measurements

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1 Introduction

This note provides a brief description of the data quality for the LPOL results since September 2003. Also, the systematic uncertainty to the given polarization values is provided.

2 Data Quality and Systematic Uncertainty

The data quality for the LPOL polarization measurement can be directly accessed in the ORACLE database.

2.1 September-December 2003

On 01/03/2004 the table **LPOL2003b_AVERAGE** has been inserted into the ORACLE database, and it refers to the polarization values for the period September-December 2003 after an off-line analysis. In this table, each entry corresponds to one minute of polarization measurement by the LPOL and the data quality is written in the field "status". The value of the data quality for this period has been determined while considering all the informations available in the logbooks and from the on-line analysis.

According to the results of the systematic studies performed during winter-2003 and spring-2004 [1], the polarization measurement appear to be stable within 2%, consistent with the quoted systematic uncertainty value 1.6% obtained by previous studies, as described in [2, 3]. Due to the above mentioned results, the systematic uncertainty of the polarization values provided for this period is 1.6%.

2.2 January-July 2004

Since January 1^{st} 2004 the LPOL was nicely functioning until May 24^{th}, when the four crystals cracked, and a huge decrease of the luminosity has been observed in the on-line analysis, affecting the working of the polarimeter and the reliability of its measurement. The systematic uncertainty until May 24^{th} for the LPOL is 1.6%, as resulting from [1, 2, 3].

Bit	Status of the Hardware
100	OK, pol.measurement in progress
110	OK, sandwich prototype operation
201	pol.calculation: bad chi-square
301	energy resolution bad
401	bunch offset wrong
501	compton cone positions bad
552	too many ADC overflows
601	calorimeter signal low
702	no updates from HERA
802	no calorimeter signal
902	laser off? (no heraclock signal!)
1000	LPOL is calibrating
1100	LPOL waiting for ramped beam
1200	calorimeter is moved out
1300	cannot read from DSP: DAQ down?
1000000	Studies bit is set

Table 2.2: Data Quality for the 2004 polarization measurement

The calorimeter has been re-built while using four identical crystals, and re-installed in the tunnel on June 19^{th}. Hereafter, the LPOL has been operated mainly to set up the hardware, and only from July 9^{th} on the LPOL polarization measurements can be used. The new crystals have the same characteristics as the previous ones, suggesting that the analyzing power should be unchanged, therefore not affecting the polarization measurement. Nevertheless, until this hypothesis is checked, we suggest to use the LPOL data since July 9^{th} considering a conservative systematic uncertainty of 5%.

For the polarization data since 1^{st} January 2004 no off-line analysis has been performed yet. The data quality provided concerns only the on-line information and is accessed in the field "status" of table **LPOL2004a_AVERAGE**. This field can have one of the on-line data quality values which refers to the status of the hardware and of the polarization measurement, as described in Tab. 2.2. The polarization entries with a good data quality, according to the on-line analysis, have status bit 100.

References

[1] A. Airapetian, R. Fabbri, B. Zihlmann, HERMES-IPR-04-014.

[2] M. Beckmann et al., The Longitudinal Polarimeter at HERA, NIM **A 479** (2002) 334-348.

[3] F. M. Menden, Determination of the Gluon Polarization in the Nucleon, PhD Thesis 2001, DESY-THESIS-2001-060.