Simulation Model Parameters Description and Workflows

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1 Introduction

This document describes in details the MC model parameters, the corresponding workflows for setting and validating them, and the procedures to calculate the corresponding systematic uncertainties.

This document is part of a series describing the CTA MC Simulation Pipeline. It is expected that the reader is familiar with the wider concept of Simulation Pipelines System as described in [1].

2 Model parameter description

2.1 Molecular profiles

MC model parameter: atmospheric profile

Description: Atmospheric model profiles with molecular density, atmospheric thickness, and index of refraction as function of altitude.

Comment: `understand if this would be same table for a curved atmosphere`

Format and units:

The following columns are required:

- *altitude* in range [0 km, 120 km]

detailed description of the format and the units required

Required accuracy:

Setting procedure: Short description and list of relevant setting / derivation groups

Validation: Short description and list of relevant validation groups

Systematic uncertainty estimation: list of relevant systematic uncertainty estimation procedures; bracketing curves (energy dependence...)

Update frequency and averaging: e.g., averaging over time, or assume that all elements are the same, etc

Data source: ACE, laboratory, etc. (needed)?

Notes: any further description / notes required

3 Workflows for Model Parameter Setting

4 Workflows for Model Parameter Validation

5 Workflows for the Estimation of Systematic Uncertainties

6 Temporary

6.1 Validation

- validation procedure for each parameter

6.2 Algorithms

- averaging
- simulation time interval finder (take also discrete events into account (e.g., change in broken pixel configuration))

6.3 I/O

- reading / writing of MC configuration data base
- reading of TOSS / SOSS data bases

6.4 Open issues

- convert any atmospheric configuration into a time-dependent systematic error if you use a different systematic error
- describe where there is a person in the loop

7 References

[1] Concept for the CTA Simulation Pipelines System Software, CTA-TRE-COM-304000-0003.1b; June 2020

[2] DPPS Requirements (2018)