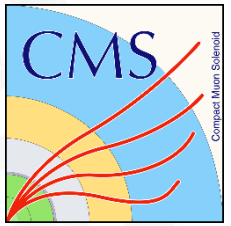

Triple Parton Scattering at CMS

ASCIOTI MARIA ELENA (mariaelena.ascioti@studenti.unipg.it)
TUTOR: DOC. MARIANI VALENTINA, PROF. FANÒ LIVIO

About me:

While in my high school years, I was introduced to Physics: I attended two Physics Master Classes and a Summer school at INFN Frascati, which convinced me to enroll in the Physics course at the University of Perugia.

In 2020 I obtained my bachelor's degree in Physics with the thesis «Equation state of neutron stars: a first approach to nuclear effects.» (Supervisor: Prof. Sergio Scopetta)

This year, in July, I obtained my master's degree in Particle Physics with the thesis «Charmed mesons as a probe for Triple Parton Scattering.» (Supervisors: Prof. Livio Fanò, Dott.ssa Valentina Mariani)

My master thesis

The object of my thesis was **Triple Parton Scattering**, namely the simultaneous interaction of three couples of partons, focusing on a specific **charmed final state** that has never been studied before:

$pp \rightarrow J/\psi + J/\psi + D^{*} + X.$

The starting point of my work was the samples production: **I have generated the TPS samples,** as well as the Single and Double Parton Scattering ones, which can mock the event of interest.

I also have **elaborated an** analysis strategy for the reconstruction of the charmed mesons. The generation and the analysis have both been done in the experimental framework of the CMS experiment at LHC.

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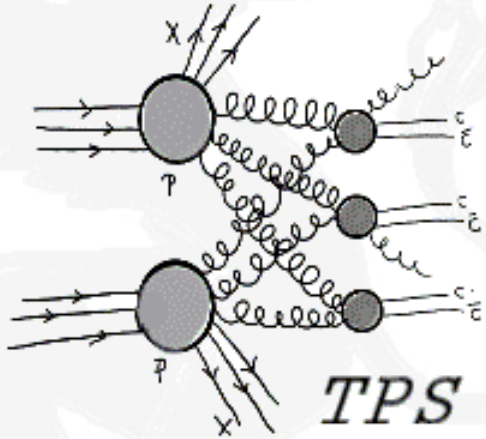

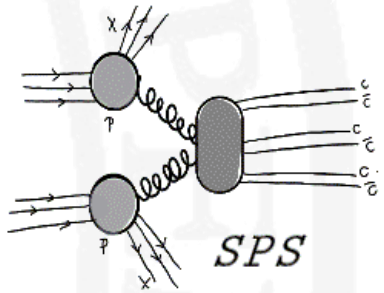

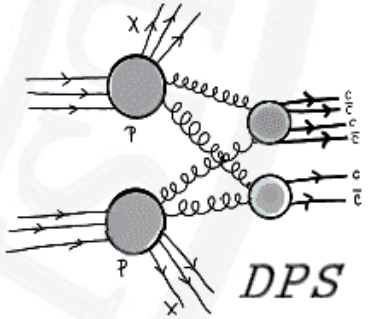

My master thesis

My thesis allowed me to:

- Elaborate and test a strategy for the production of the mandatory Monte Carlo samples to produce the desired final state:

$$J/\psi + J/\psi + D^{*} + X.$$

- Test the joint usage of two generators: Helac-ONIA and Pythia, elaborating a strategy to produce the Single, Double and Triple Parton Scattering samples.
- Elaborate on a reconstruction strategy.

Doctoral project

Starting from the achievement obtained by my master thesis the preliminary study of the selected charmed state produced via TPS will become a full analysis of the Run II data set.

During these three years I will:

1) Convalidate the generation procedure
2) Enlarge the initial statistic
3) Elaborate the analysis strategy
4) Analysis of Run II dataset (and possibly Run III)

The analysis goals are:

- identify the number of events produced via TPS, DPS and SPS -> first 18-20 months
- characterize the events (kinematics and correlation relationships) -> consequently to the first step

In the meanwhile

- Talk at SIF National Congress in Milan 12-16 September 2022, «Triple Parton Scattering at CMS»;
- Introduction course in Physics, Department of Pharmaceutical Science (UNIPG), September 2022;
- Physics tutor, Geology course (UNIPG), 1° and 2° semester 2022/2023;
- Tutor for Progetto Lauree Scientifiche 2022/2023.