

# Yellow Report Contributions

## Chapter 1

### ***Beam related background***

### ***Trigger strategy for CMS/Totem***

*Considerations on rates at low and high lumi based on existing data and extrapolation; integration of the RP detectors in CMS-DAQ--> HLT*

## Chapter 3

### ***Diffraction (Soft & Hard) with proton tag***

*Soft SD, Double Diffraction, Single Diffraction dijets, "multi gap events"*

### ***Single diffractive J/psi***

## Chapter 5

### ***Central Diffraction with protons tag***

*Inclusive central diffraction; low mass state resonances; CD dijets ; Missing Mass searches*

## Chapter 7

### ***Charged particle multiplicity***

*dN/deta in T2; multiplicity correlations forward-backward & forward-central, dN/deta with in SD; T2 + Castor*

## Plan for yellow report

### General instructions:

**This report is not aimed to be proceedings of existing results. The aim is to define the future program of the LHC in terms of forward physics, namely what you write will have a direct impact on the LHC operation. We want to define the physics case, the needed amount of luminosity, the beam conditions... to perform this physics program, so that it can be defended in front of the LHCC and the different LHC experiments.**

**For each experiment driven contribution, please provide the following information:**

- **present situation: existing analyses and possible analyses which would use present accumulated data – please make sure not to request data that have already been taken ☺**
- **what is the physics motivation, and how can the analysis be improved with present (2015) detector configuration, having for instance special low/medium luminosity runs (this will include the amount of luminosity needed such as 1 pb<sup>-1</sup>, 10 pb<sup>-1</sup>, 100 pb<sup>-1</sup> and the beam conditions such as  $\mu=0.1, 0.5, 1...$ )?**
- **how can it be improved with better/new detectors (such as Rad hard Si detectors, AFP, new scintillators, timing detectors...)?**

**For more theoretical contributions, please provide the following information:**

- **physics case interest and added value of the new measurements**
- **explanation of the observables and kinematic phase space needed to make the measurement**
- **please try to translate these conditions into beam conditions, luminosity, detector options**

**This information should be provided by the February meeting in a talk or latest March 15 by email to the people responsible for each chapter.**

**We are also asking for a written contribution for the yellow report. Since the final version of the yellow report is due in the beginning of September, we ask the written contributions to be sent to the people responsible for each chapter by July 31.**

### Chapter 1: Introduction – Christophe Royon/Nicolo Cartiglia/Jochen Bartels

Summary of physics motivation, processes of interest (for all luminosities)

Detector acceptances and resolution (especially for forward proton detectors), xi, t, mass

Beam conditions, properties, **backgrounds**, Valentina Avati (could be a chapter by itself?) **Triggers**

Simulation inside tunnel (ATLAS, LHCb, CMS-Totem)

### Chapter 2: Monte Carlo – Lucian Harland Lang/Paula Collins

Short overview

Describes all Monte Carlo used in the following – *comparison between different MC and mention which one has to be used for each topic (for instance: Superchic is used for excl. events using KMR...)*

*NB: For “standard” MC, focus on forward physics, need of a better understanding in the forward direction – comparisons between MCs are needed*

Pythia – Peter Skands – Sercan Sen - Rockefeller group (Christina Mesropian...)

Herwig – Gieseke?

Phojet - NN

FPMC – Oldrich Kepka, Christophe Royon, Matthias Saimpert

Exhume – Andy Pilkington

Superchic – Valery Khoze, Lucian Harland Lang

DIME – Lucian Harland Lang

QSJET –

Multiple interaction treatment in MC – double J/Psi...

Highlight theoretical uncertainty on differences between p-p and Pom-p – Peter Skands/Martin Poghosyan (Alice)

Others?????

### Chapter 3: Soft diffraction and total cross section – Tim Martin/Valentina Avati

Short overview

**Soft diffraction results and prospects with gaps and proton tagging-** Oldrich Kepka / Tim Martin + TOTEM (2 contributions)

Total cross section prospects – TOTEM/ALFA (2 contributions)

**Single diffractive J/psi -TOTEM+CMS**

Charge exchange - Rainer Schicker

P ion – CMS

### Chapter 4: inclusive hard diffraction – Maciej Trzebinski (tbc)/Marta Ruspa

Short overview

**SD dijet production - Vlastimil Kus, ATLAS, TOTEM+CMS**

Single tag events+jet: Maciej Trzebinski

**Dijets and photon+jet, comparison with SCI** - Christophe Royon, Matthias Saimpert, Cyrille Marquet, Dominik Werder, CMS-TOTEM

W/Z events: Rafal Staszewski, Christophe Royon, Dominik Werder, Diego Figueiredo

### Chapter 5: central exclusive production (including gluon and photon exchanges) – Matthias Saimpert / Oldrich Kepka / Paula Collins / Lucian Harland-Lang (tbc)

This chapter should describe present results, incoming ones and prospects for higher lumi/different beam conditions

## **Introduction: photon and exclusive QCD exchanges**

### **Rapidity gap measurements – Oldrich Kepka – Lucian Harland Lang – Paula Collins**

Short overview

Low lumi dijets – Plots from Durham MC (*Lucian Harland-Lang*)

Diphoton production – *Mike Albrow, Durham*

Exclusive production of J/Psi, Upsilon, Phi. *Antoni Szczurek, Wolfgang Schafer*

Vector mesons – *Lucian Harland Lang, Valery Khoze, LHCb*

High cross section results from LHCb and prospects –

Low mass central production – *Alice, Martin Proghosyan*

### **Proton tagging measurements – includes low/medium lumi and high/low beta Lucian Harland-Lang – Antonio Vilela**

Pi pi results – *Maciej Trzebinski, Rafal Staszewski – 1104.3568*

Pi pi results – *TOTEM*

Low lumi dijets- *TOTEM+CMS (Ken Osterberg)+Durham*

Other low mass states resonances: meson pair production, KK, rho rho, eta eta, eta eta', Glueball searches? P<sub>t</sub> filter with tagged protons? – *TOTEM+CMS, Antoni Szczurek, additional plots from DIME MC (Lucian Harland Lang)*

Upsilon Results – *CMS*

Benefit of tagging protons- guaranteeing exclusivity, measurement of proton azimuthal angular distribution as a probe of survival factors/spin of produced resonance

'Invisible' searches- missing mass topologies with tagged protons. (*TOTEM+CMS*)

Single tag, exclusive jets: *Lucian Harland Lang, Maciej Trzebinski*

### **High lumi – Matthias Saimpert – Jonathan Heller**

Exclusive jets (two tags): *Maciej Trzebinski*

Anomalous couplings WW/ZZ/gamma gamma: *Matthias Saimpert, Oldrich Kepka, Christophe Royon*, theoretical motivation: *Christophe Grojean, Gero von Gersdorff, Sylvain Fichet*

Technipions – *Antoni Szczurek, Roman Pasechnik*

## **Chapter 6: forward physics (saturation, BFKL, Mueller Navelet, Jet gap jet) - Cyrille Marquet / Jochen Bartels / Hannes Jung (tbc)**

Short overview – needs to focus on new prospects, what can be achieved given the present detectors, what can be improved (for instance: better forward coverage using Totem+CMS+castor)

### **BFKL, small x physics**

Introduction to BFKL (short) – *Cyrille Marquet*

Mueller Navelet jets – *Agustin Sabio Vera, Murdaca, Bertrand Ducloue, Cyrille Marquet, CMS/ATLAS results (Hannes Jung...)*

Jet gap jet (inclusive and DPE) – *Cyrille Marquet, Maciej Trzebinski, Christophe Royon*

Jet veto – *Cyrille Marquet, Dominik Werder, Christophe Royon*

Double J/Psi – *LHCb*

(Multiple parton interactions (and survival probability) – *Hannes Jung, Mark Strikman – see MC session*)

### **Small x and saturation**

Forward Drell Yan in pp – *Beatriz Gay Ducatti, De Oliveira, Lewandowska, LHCb*

Forward photons in pA – *Peltzmann*

Forward jets in pp, pA – *Krzysztof Kutak, Piotr Kotko*

Exclusive VM in UPC – *Guillermo Contreras, Daniel Takaki*

## **Chapter 7: cosmic ray physics, particle multiplicities, correlations and spectra – Tanguy Pierog**

Short overview

### **Cosmic ray physics, MC tuning....**

Proton Oxygen and proton lead to tune MC –

Results and prospects – *LHCf*

*Alice?*

### **Particle multiplicity**

Charged particle, forward energy, identified particle spectra -*T. Martin*. For AFP at beta\*≈0.55m (collision optics) and ALFA at 0.55 and 90m.

Charged + neutral spectra. Status + plans, *CMS/Totem*

Forward energy flow and charged multiplicity – *LHCb*

## **Chapter 8: heavy ion physics (ion-ion and p-ion) – Daniel Takaki – Do we need that chapter or paragraphs in the other chapters?**

Wait for inputs from Daniel, discussion with a few people – discussion during  
February meeting

Short overview

*Alice?*

*LHCb – Michael Schmelling*

## **Chapter 9: Detectors – Joachim Baechler, Michael Rijssenbeek**

Short overview

AFP project – *Marco Bruschi, Christophe Royon*

PPS project – *Nicolo Cartaglia, Joachim Baechler, Ken Osterberg?*

### **Forward proton detectors**

Roman pot techniques – *Joachim Baechler, Michael Rijseenbeek*

Movable beam pipes – *Mike Albrow*

420 m upgrade -

### **Si detectors**

Si pixels – *Petr Sicho*

*CMS?*

### **Timing detectors**

QUARTIC (principle+test)– *Mike Albrow*

QUARTIC tests in ATLAS – *Michael Rijseenbeek, Andrew Brandt*

SAMPIC electronics and tests – *Eric Delagnes, Matthias Saimpert, Christophe Royon*

Si timing – *Nicolo Cartaglia*

Diamonds for Totem (100 ps) – *Joachim Baechler*

Diamonds – *Nicola Turini, Gabriele Chiodini*