

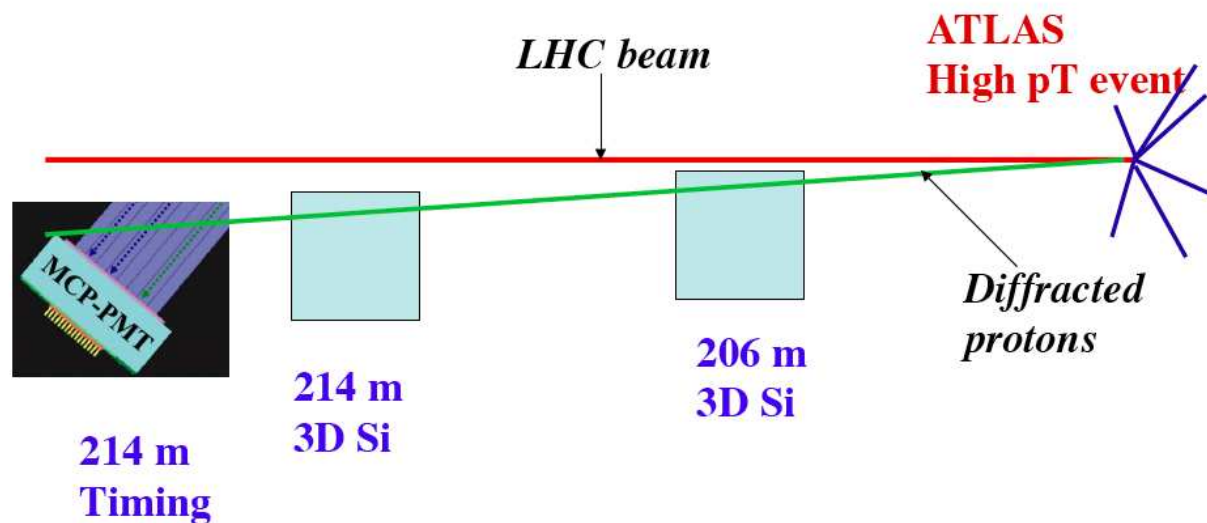
# Discussion session: AFP physics

Christophe Royon  
IRFU-SPP, CEA Saclay

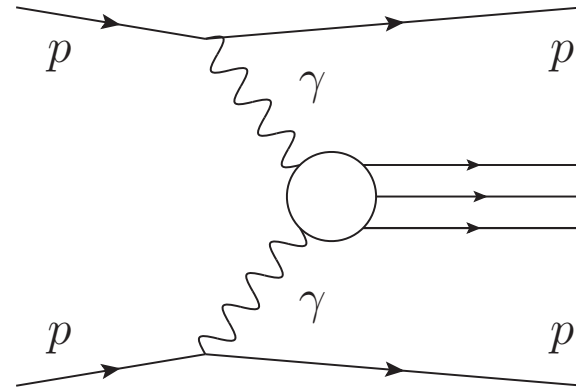
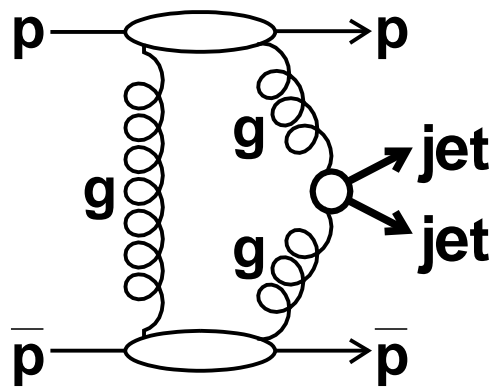
Workshop on QCD and diffraction at the LHC, November 26-28 2012,  
Cracow, Poland

## Contents:

- QCD
- Exploratory physics



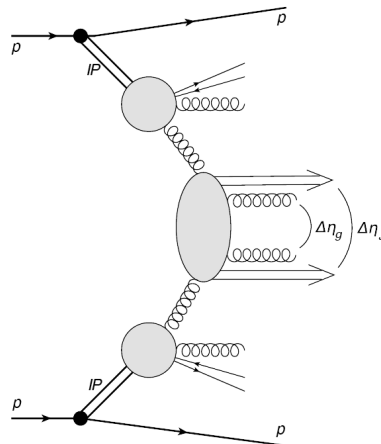
## How to enhance AFP physics (1): full lumi needed



- Main idea: production of objects in which background can be extremely reduced by kinematical constraints coming from AFP proton measurements (system fully constrained)
- Many anomalous couplings to be studied involving Higgs boson or not: dimension 6 and 8 operators appearing leading to anomalous production of  $WW$ ,  $ZZ$ ,  $\gamma\gamma$ :  $\gamma\gamma$  is specially interesting (Christophe Grojean)
- Possibility to probe  $WWWW$ ,  $ZZZZ$ ,  $WWZZ$ ,  $WWZ$  couplings as a test of electroweak theories (characteristic of Higgs boson or modified by BSM effects), new ideas proposed by Jochen Bartels (Weinberg was mentioning this is THE test of the SM)
- Production of magnetic monopoles
- Resonant sparticle production in SUSY processes or production in pairs in channels difficult for ATLAS (charginos...)
- Production of new objects to be produced either by photon or gluon exchanges: KK resonances, SUSY, black holes...
- Diffractive Higgs: Higher order effects?

## How to enhance AFP physics (2): QCD

- Exclusive jets (full lumi): Fundamental to test exclusive QCD in diffraction (exclusive Higgs higher order corrections are large, the prediction is more precise for the ratio exclusive jets to Higgs)
- 1 day at  $\mu = 1$  is  $\sim 20 \text{ pb}^{-1}$
- Single diffraction and measurement of survival probability: jets, W, Z...
- Pomeron structure and DGLAP analysis of gluon/quark densities
- Probe the structure of diffraction: understand in terms of hard QCD (pomeron) or soft interactions (SCI), analysis of dijet/ $\gamma$ + jet cross sections, allows to probe the quark densities in pomeron
- Tests of BFKL evolution equation using jet gap jet in diffractive events (C. Royon, C. Marquet, M. Trzebinski): fundamental QCD tests, probably the best method to look for BFKL resummation effects



- Possible change of LHC lattice to obtain better AFP acceptance down to  $\xi \sim 0.001$