



TOTEM

detector simulation: trigger studies

(work in progress)



T1 and T2 simulation

- T1 and T2 description is working inside CMS code for simulation **OSCAR**.
- A **root file** is created with the list of the hits and their properties (energy, particle type, etc.)
- root macros are (at the moment) used to perform analysis



Roman Pot (RP) information

- get RP information from OSCAR-simulation.
- feasible considering the evolution of leading proton trajectory following the transport matrices of the beam lattice, for different β^* and RP locations.

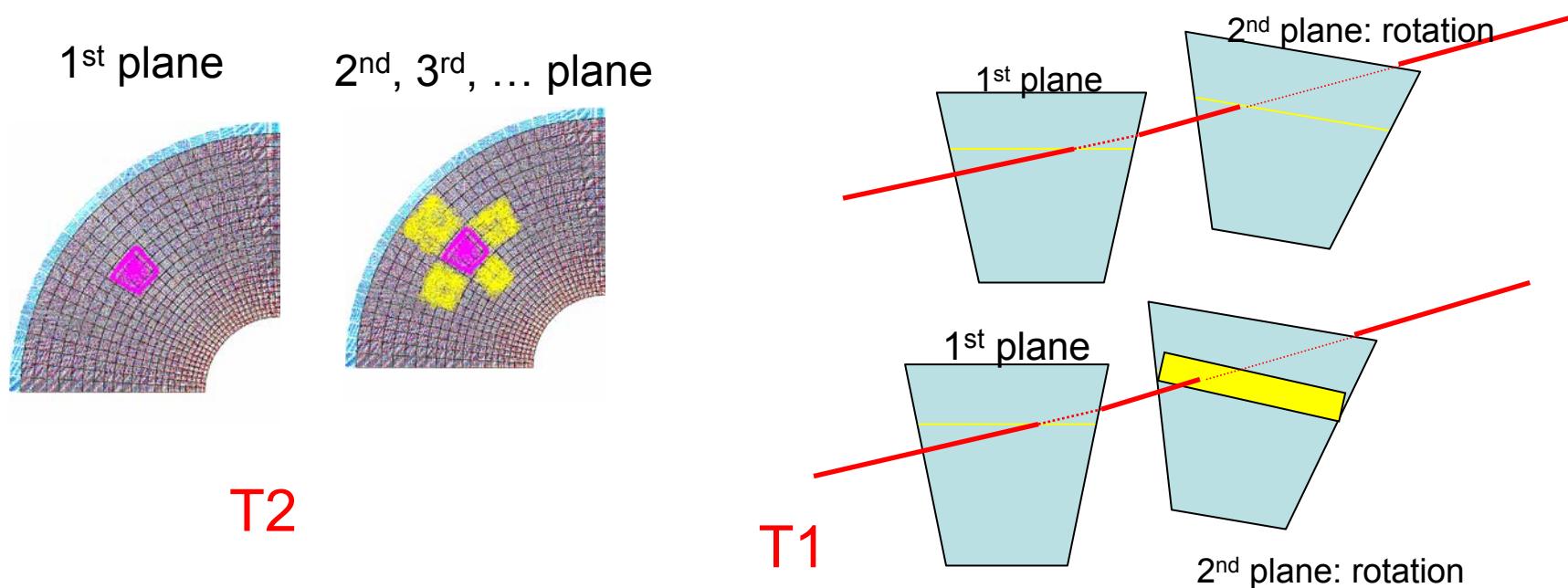
$$x = L_x(\xi) \theta_x^* + v_x(\xi) x^* + \xi D_x(\xi) \quad y = L_y(\xi) \theta_y^* + v_y(\xi) y^*$$

Dependence has been parameterized for $\beta^* = 0.5, 200, 1540$.

- This way (at least) the **RP acceptance can be included together with T1 & T2 (almost ready)**.
- Resolution on proton parameters are done in a separate environment (MADX...)

Trigger patterns

- Starting point TDR rates
- Implementation of more accurate trigger patterns for T1 and T2
- Technicalities now ready. Tests are running.





Some considerations

- At low luminosity (10^{28} - 10^{29})
 - e.g. Single Diffraction: high efficiency expected (TDR studies) and high purity (pointing trigger to reject *beam-gas* and leading proton trigger in addition)
- At higher luminosity: can we trigger with rapidity gaps with T1, T2 and Leading Proton detectors?
- Studying the possibility of using T1+HF and T2+CASTOR (tracking+calorimetry)



Ongoing work

- Simulate events with dedicated generators to study trigger rates for specific processes
- Re-estimate beam-gas background
- Interface with CMS in order to have e.g. calorimetric seeds/provide tracking info.
- Estimate with CMS jets + leading protons trigger rates for e.g. double Pomeron evts.