Studies on B→J/psi

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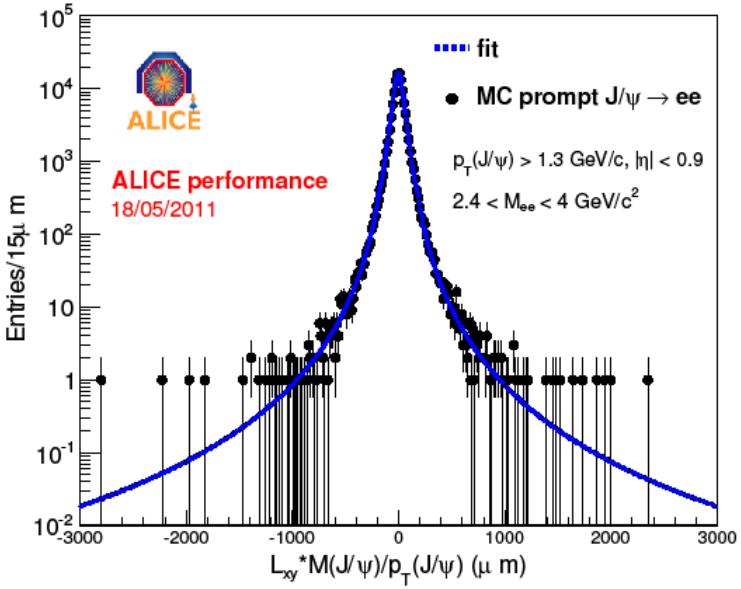
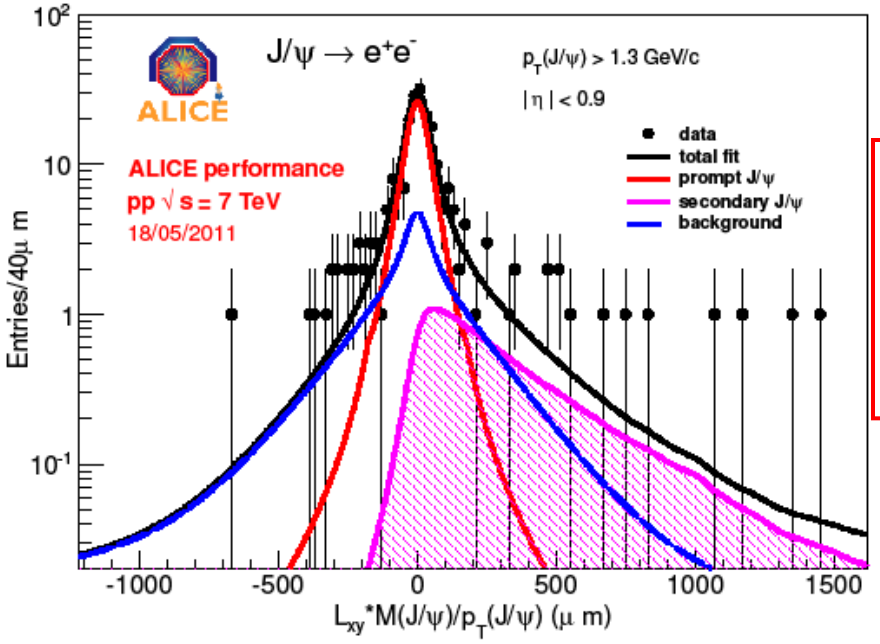
B from dislaced J/psi: status

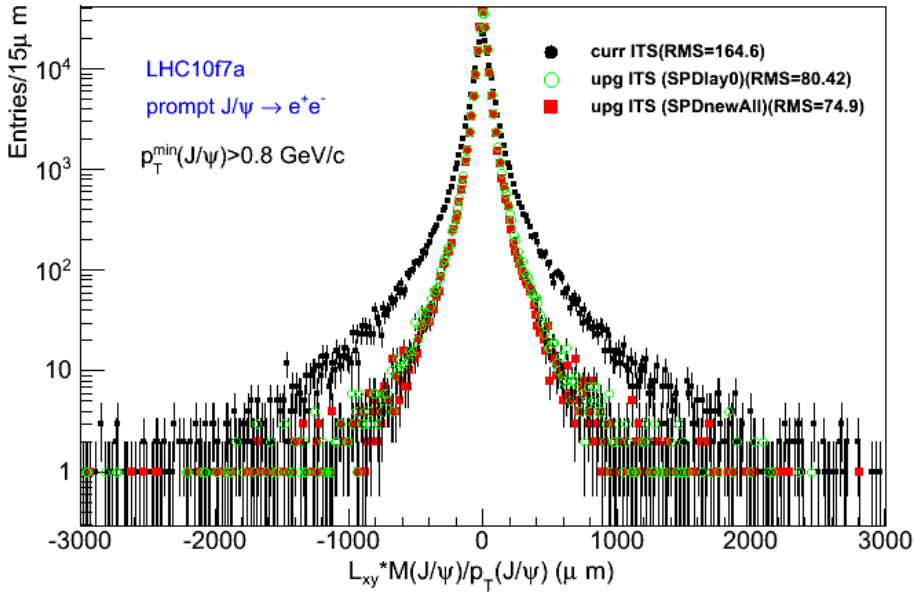
- Section completed, figures included:
  - Current ITS:
    - Pseudo-proper decay length resolution
    - Current ALICE performance for the non prompt to prompt J/psi ratio measurement using the likelihood fit approach
  - Uprade ITS:
    - Pseudo-proper decay length resolution obtained with NewSPD/AllNew configuration.
    - resolution function RMS vs. J/psi minimum pT compared against the current ITS configuration.
    - ALICE performance plot for the non prompt to prompt J/psi ratio measurement using likelihood fit. The statistics assumed for B$\rightarrow$J/psi event is the one expected in a realistic PbPb data taking scenario using an EMCAL trigger for electron pairs

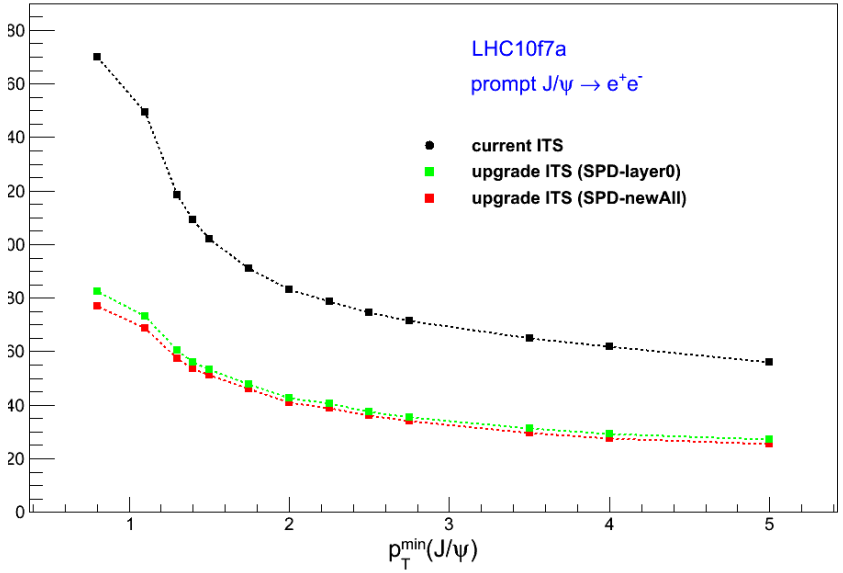
B from dislaced J/psi: current vs. upgrade





CURRENT





UPGRADE

- $B \rightarrow J/\psi$ analysis requirements:
  - Increase statistical significance → we need a proper trigger for electrons
  - Keep J/ψ transverse momentum reach reasonably low, i.e ~ 1.3-1.5 GeV/c ($p_T(B) \rightarrow 0$)

- Trigger scheme: 2 possible scenarios
  - Actual: use of EMCAL (+TRD) in pp and PbPb collisions → trigger on single/double electrons
  - Future: use of a topological trigger with ITS
  - Both of them need quantitative study and optimization: some quantitative estimations for the EMCAL trigger have been discussed.

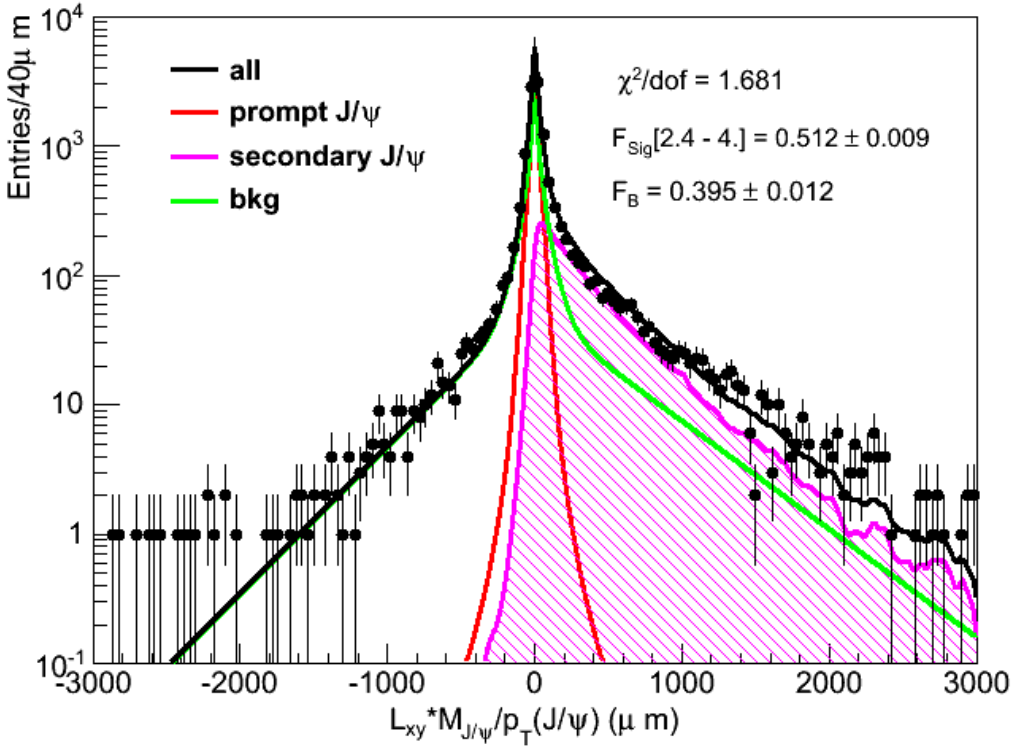
1st scenario: EMCAL trigger

- Current status: rare triggers runs since 2 June (→ see F.Antinori, PF 15/06/2011):
  - 100 kHz interaction rate, ~ 30 Hz EMCAL L0 (momentum threshold = 4.8 GeV on single track) + mix of other rare triggers.
- Low $p_T(J/\psi)$ reach requirement → need to go below 4 GeV on single electron momentum threshold with EMCAL. At least a 2-2.5 GeV transverse momentum cut for single electrons and 1.7-2 GeV for electron pairs should be used.
- single electron trigger with EMCAL not feasible for B→J/psi studies in PbPb ($\sqrt{s}$NN = 5.5TeV min. bias):
  - Assuming a 2 GeV cut on single electrons and 8kHz interaction rate → ~ 500 Hz for events with a single electron in the EMCAL acceptance which can be triggered at L0
- double electrons trigger with EMCAL more promising for B→J/psi studies in PbPb ($\sqrt{s}$NN = 5.5TeV min. bias):
  - Analogous calculations gives → ~ 15 Hz for events with at least 2 electrons in the EMCAL acceptance
  - Main problem: low efficiency for pT(J/psi) down to 1.3-1.7 GeV

B→J/psi performance plot

- ITS upgrade (NewAll conf.)

- In √sNN = 5.5TeV PbPb MB , ~4500 B→J/psi→ee expected in the EMCAL acceptance using a double electron trigger (roughly assuming ~ 50% trigger efficiency and ~50% tracking efficiency for the pair.)



- Realistic PbPb data taking scenario is assumed, i.e: 3 weeks of data taking (30% of total time with stable beams, ~10 % of total time dedicated to rare triggers) with a conservative interaction rate ~500-1000Hz.

2nd scenario: topological trigger with ITS

- Possible scheme for $B \rightarrow J/\psi(\rightarrow ee)$ analysis:
  - L2 trigger
  - build J/ψ candidate in ITS applying invariant mass constraints
  - look at corresponding tracks in TRD which:
    - Are compatible with two electrons
    - Point back to a secondary vertex far away from the interaction vertex
  - Cut on the impact parameter/pseudoproper-decay-length ($c\tau(B) \sim 500\mu m$)

- Advantage is the rejection of the component from prompt J/ψ
  - Needs a rethinking of the analysis