$\Lambda_c \to p\mu\mu$, $\Lambda_c \to \mu\mu\mu$

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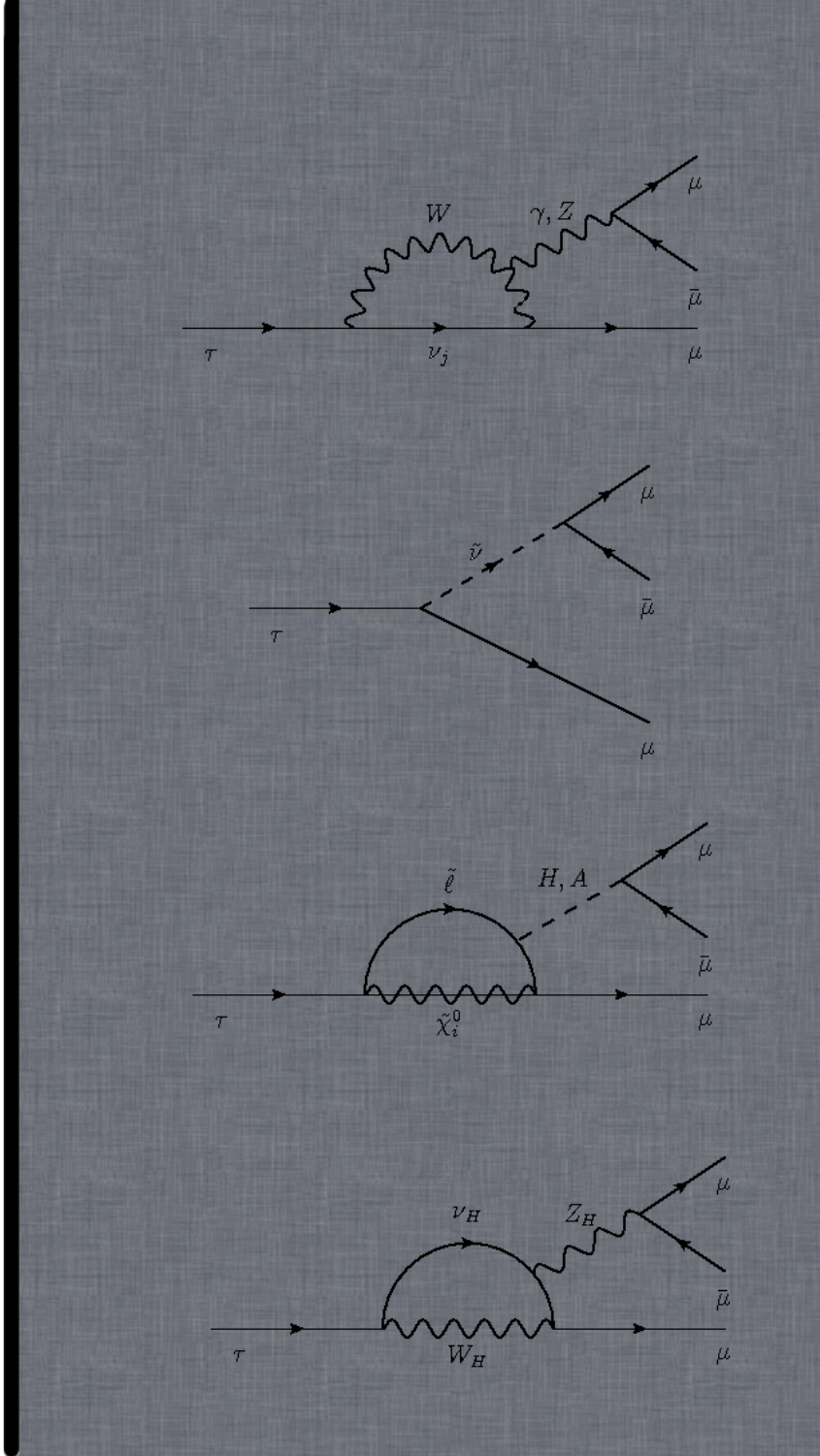
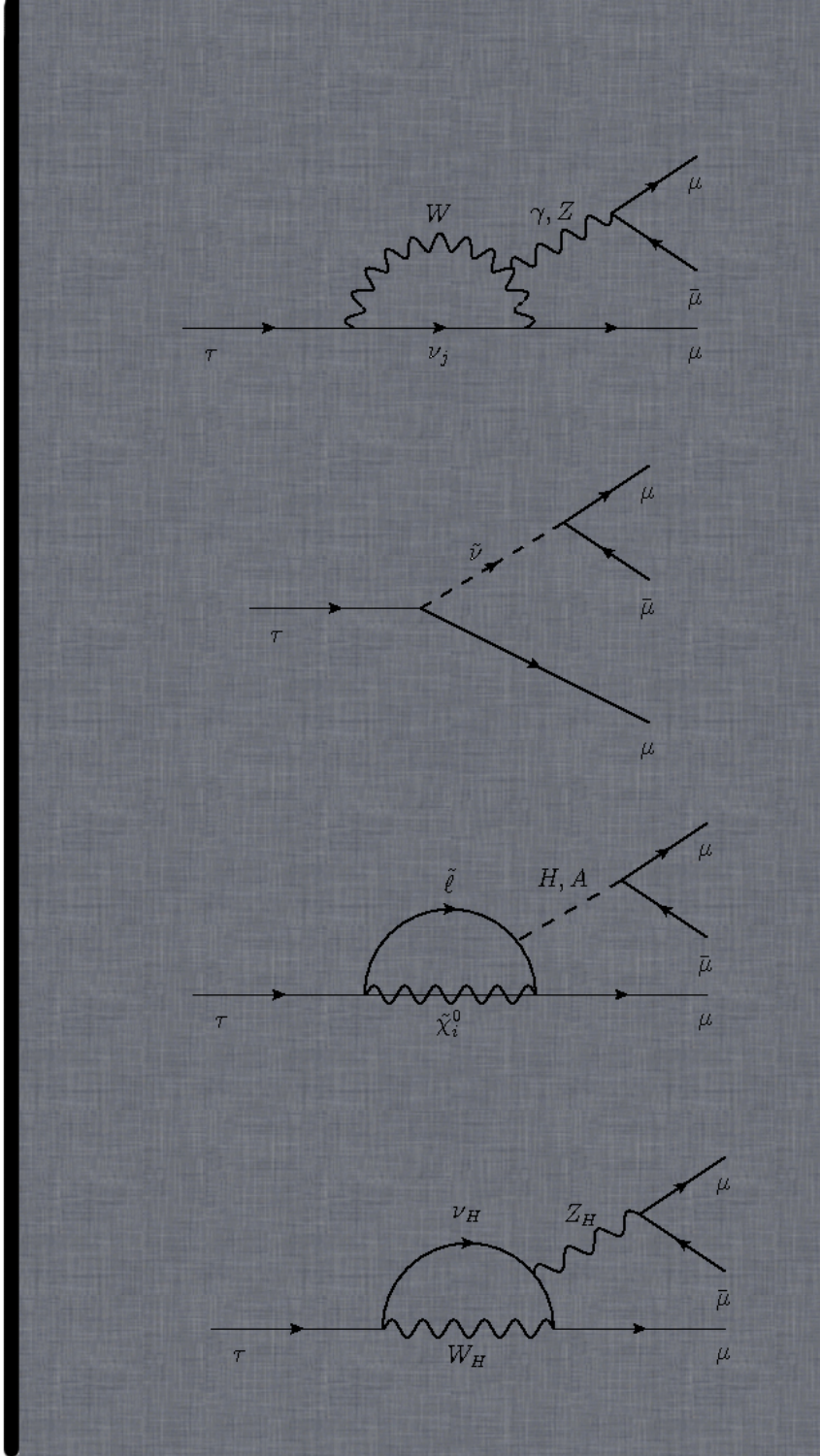


Motivation

Strategy

Comparison Λ_c vs τ

Work done so far



Motivation

Following the success of $\tau \to 3\mu$ and $\tau \to p\mu\mu$ (published 2 weeks ago) we decided to go one step further and analyse analogous channels for Λ_c.

- Decays have different physics motivations:

$\tau \to 3\mu$ LFV	$\Lambda_c \to 3\mu$ $\lvert B - L\rvert = 0$
$\tau^+ \to p\mu^-\mu^+$ $\lvert B - L\rvert = 0$	$\Lambda_c^+ \to p\mu^-\mu^+$ FCNC
$\tau^+ \to \bar{p}\mu^+\mu^+$ $\lvert B - L\rvert = 0$	$\Lambda_c^+ \to \bar{p}\mu^+\mu^+$ $\lvert B - L\rvert = 0$

- The current limits (@ 90% CL):

$\mathcal{B}(\Lambda_c^+ \to p\mu^-\mu^+) < 4.4 \times 10^{-5}$, arXiv:1107.4465
$\mathcal{B}(\Lambda_c^+ \to \bar{p}\mu^+\mu^+) < 9.4 \times 10^{-6}$
$\mathcal{B}(\Lambda_c^+ \to 3\mu)$ No constraints!

M.Chrząszcz 2012

Strategy

Follow the strategy of τ analysis:

- Take prompt Λ_c, separate approach to SL.
- Loose cut preselection.
- Train MVA on MC prompt signal and recalibrate on data.
- Mass resolution we expect similar to τ. 15*MeV* for 3μ and 9*Mev* for $p\mu\mu$. Mean recalibrated from data on $\Lambda_c^+ \to pK^-\pi^+$.
- Normalize to $\Lambda_c^+ \to pK^-\pi^+$.
- Optimise the binning in MVA.
- CLs method for limit.

Comparison Λ_c vs τ

Strong sides of Λ_c:

- No SM background in 3μ case ($\mathrm{D_s} \to \eta(\mu\mu\gamma)\mu\nu$)
- Smaller combinatorial background than in τ decays. ☺

Weaker sides of Λ_c:

- Smaller no. of Λ_c than τ to begin with.
- Need to study very carefully Λ_c production and backgrounds. ☹

Work done so far

- $\Lambda_c \to p\mu\mu$ is already stripped(line was with τ line all along).
- $\Lambda_c \to 3\mu$ is being stripped in incremental stripping.
- Requested 1M signal samples. Production will start next weak.
- Background studies. (see backup slides).

Backup Slides

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