Flash Talk: Shifts!

TOMMY LAM

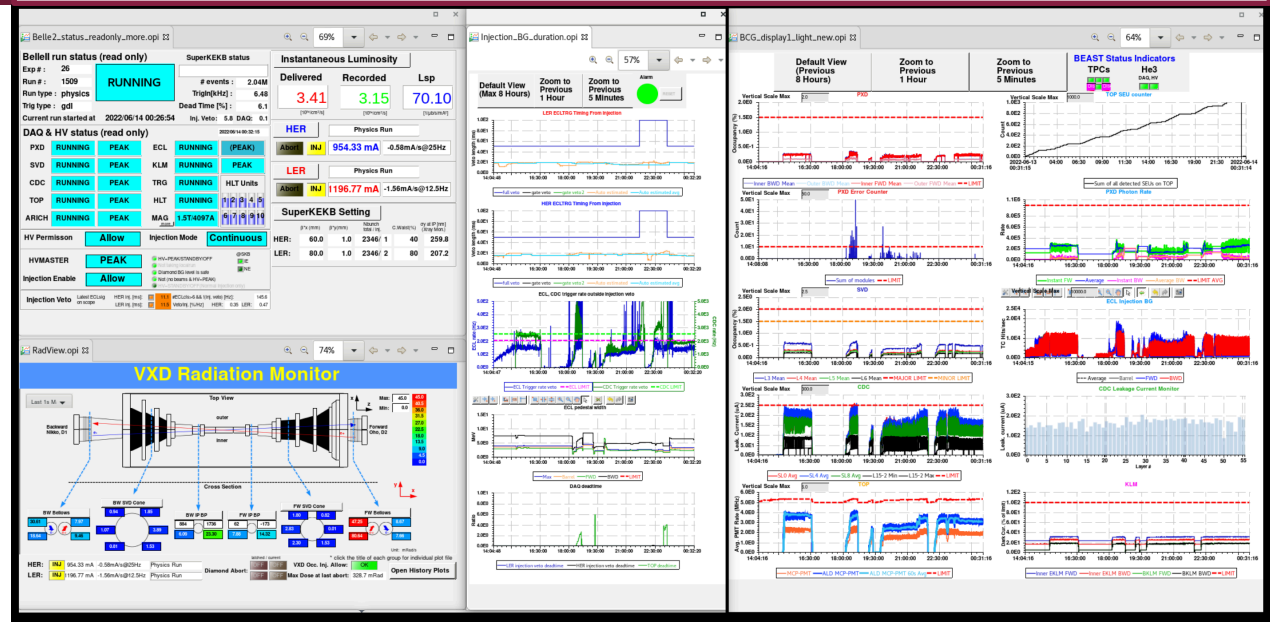
2022 AUGUST 5

VIRGINIA TECH™

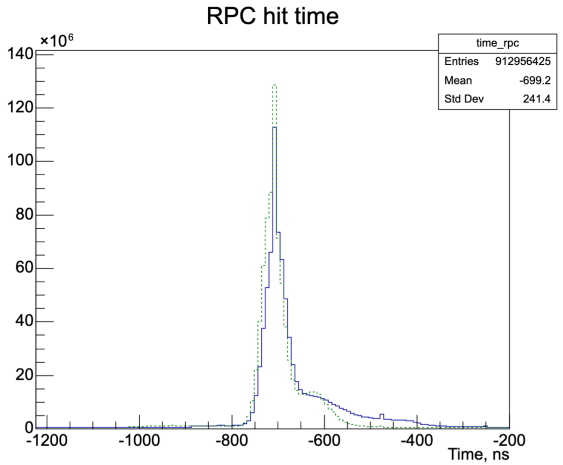
During Run periods…

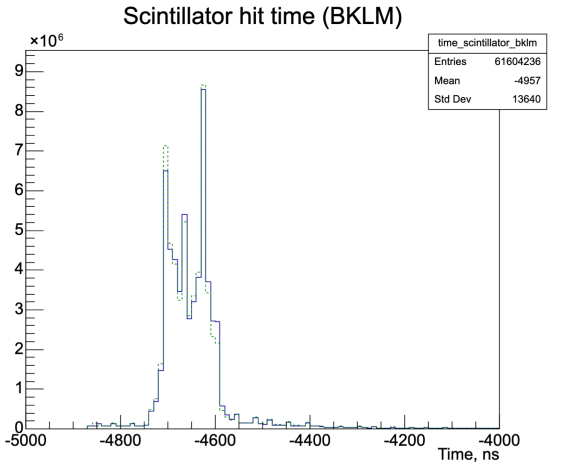
BCG! [Please see Yoshihara-san's talk (Day 4)]

Belle II control room (PC: me)



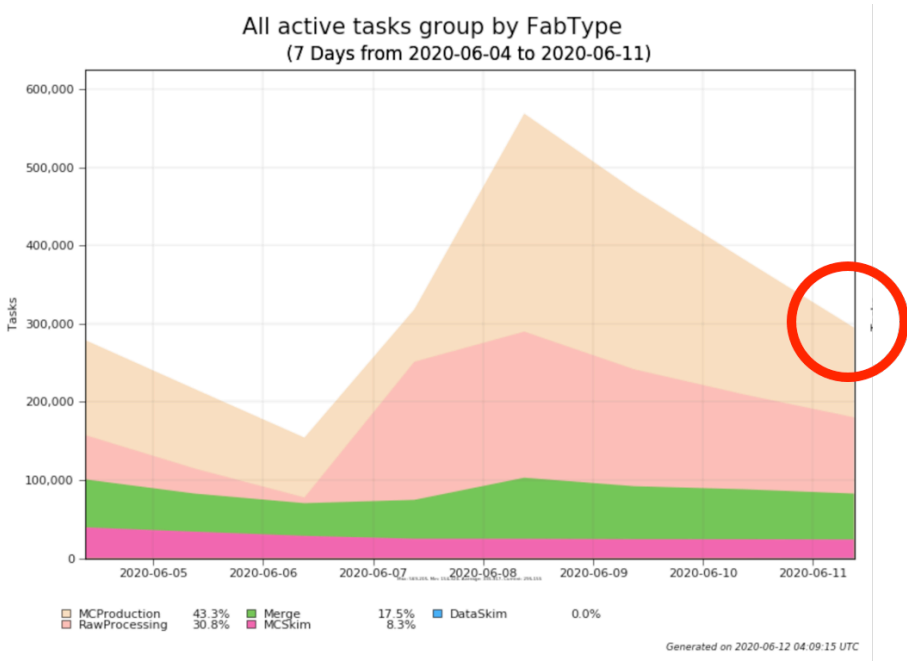
Detector plots…





Data Production Shift?

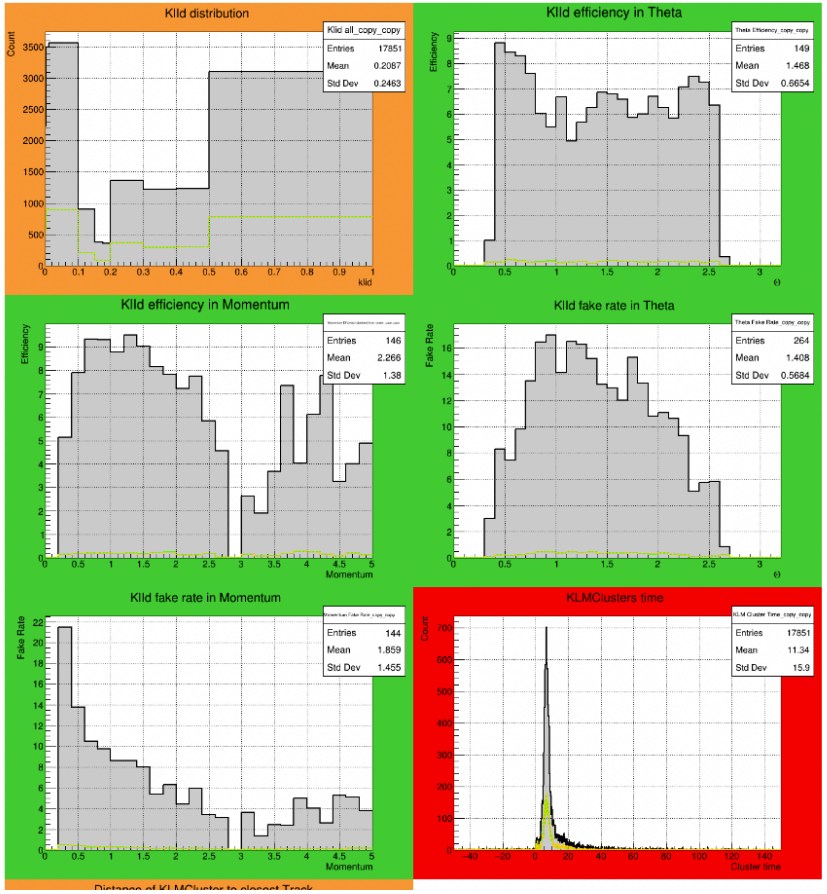
- Responsibility:
  - Monitor the system and activities
  - Collect information and record them on the shift log
  - Report issues to the operation experts
  - Update the Operation Status summary page
- Please see Justin Guilliams talk (Day 2)



SOURCE: https://confluence.desy.de/display/BI/Data+Production+Shifter+Manual

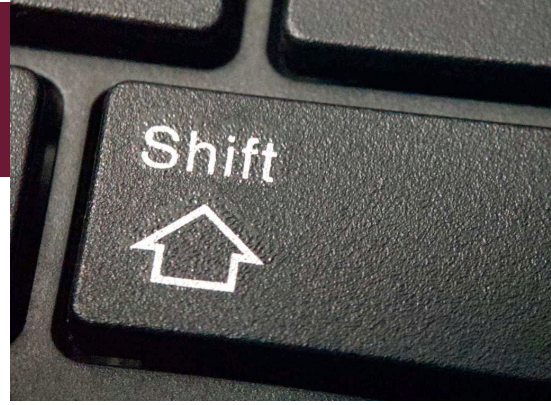
Software Quality Shift

- Responsibility:
  - Communicate (i.e. software meetings)
  - Detect Problems
  - Report Problems
  - Solve Problems
- “Every Belle II member can take software quality shifts. You don't have to be a software expert.”
- See Frank Meier’s hands-on session (Day 1)

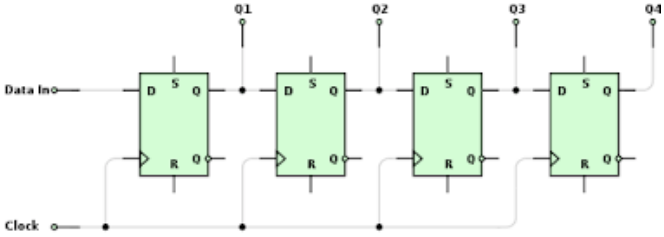


SOURCE: https://confluence.desy.de/display/BI/Software+SoftwareQualityShifts,

Summary



- Why you should take shifts:
  - Great way to learn about Belle II operations
  - Great way to contribute and get some visibility
  - Find a potential service task (if needed)
  - Ensure smooth operations for Belle II



The ~~Do's and~~ Don't's of Belle II (and workflow)

Logan Benninghoff

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The Warnings List

- Don’t do your analysis on your own, reach out to a working group

  confluence.desy.de/display/BI/Physics+Working+Groups

- Don’t trust the trigger system (to save your data)
- Don’t forget about the documentation when making your steering file

  https://software.belle2.org/development/sphinx/index.html

- Test steering file offline
- Don’t use mdst’s, udst’s are preferred

  https://confluence.desy.de/display/BI/Skimming+Homepage

- Don’t make your own Monte Carlo if you want publishable work
- Data files are tied to a release. Make sure you’re using the right ones
- Don’t leave completed jobs lying around, download your ntuple and go

  gb2_ds_rm

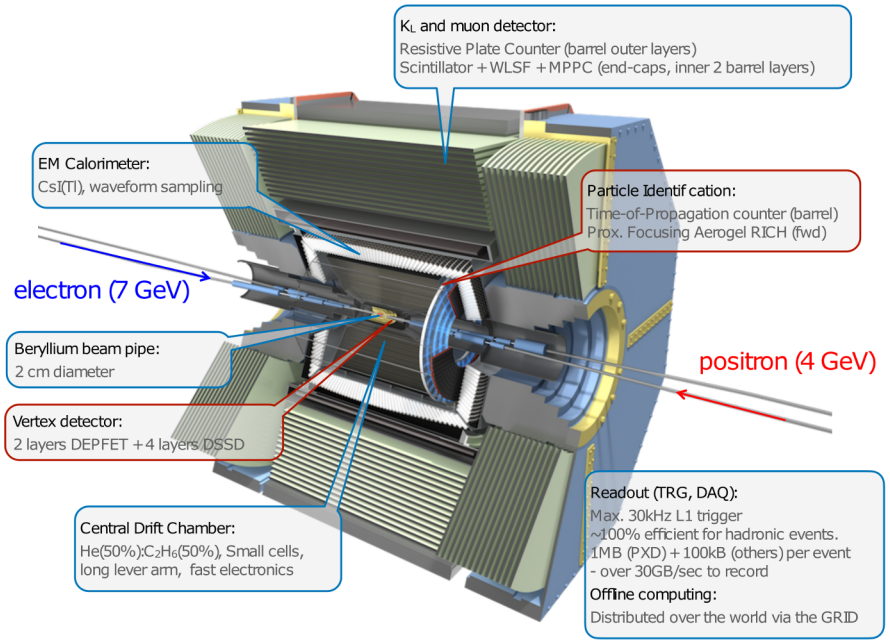
Don’t forget to thank your hosts!

(Some of) My Takeaways from B2SW 2022

Wil Stacy

THE UNIVERSITY of MISSISSIPPI

Belle II Detectors



- My studies have utilized data from the CDC and iTOP (mostly the CDC)
- Shallow knowledge of PXD and SVD, little to no understanding of anything past the iTOP (ECL and KLM)
    - Leaving with a clearer understanding of the roles these detectors play
- Important to have a comprehensive understanding of the detector
    - Can't improve a detector that I don't understand

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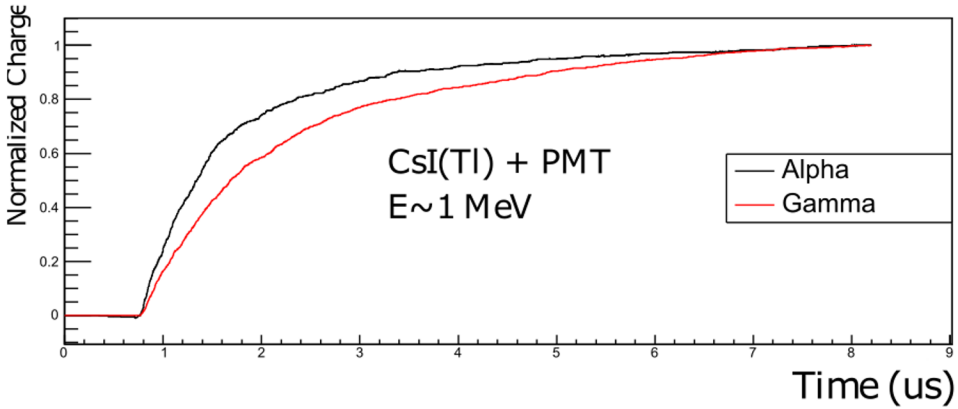

Source: Dr. Longo's Calorimetry presentation

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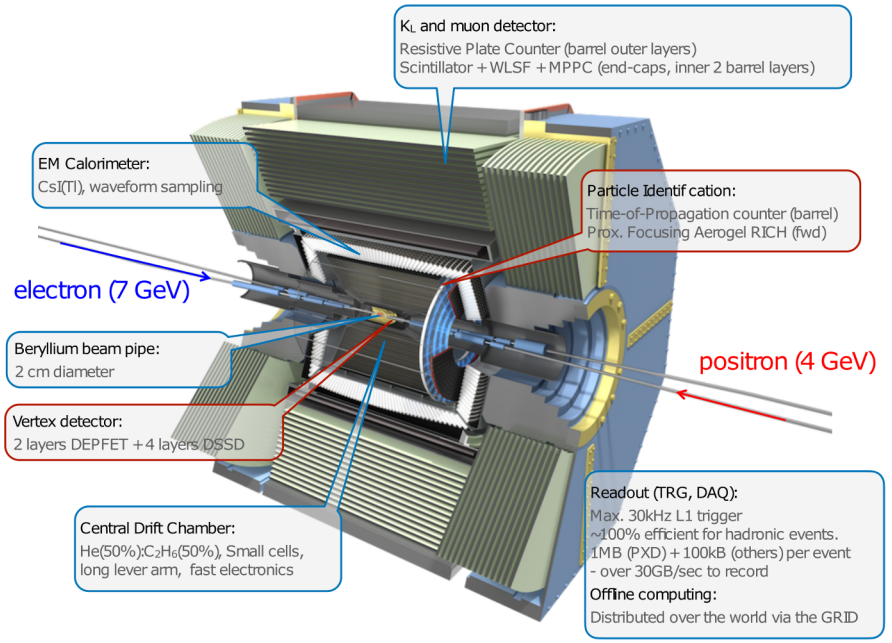

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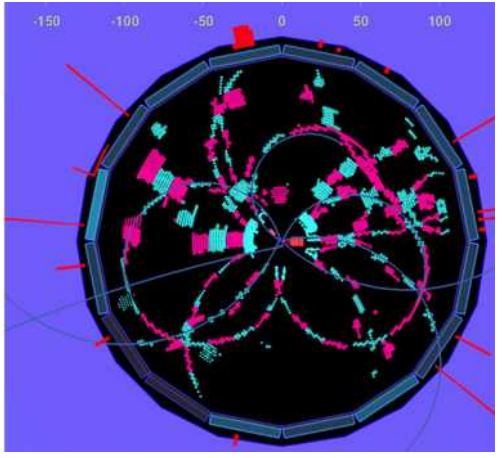
basf2 and Steering Scripts

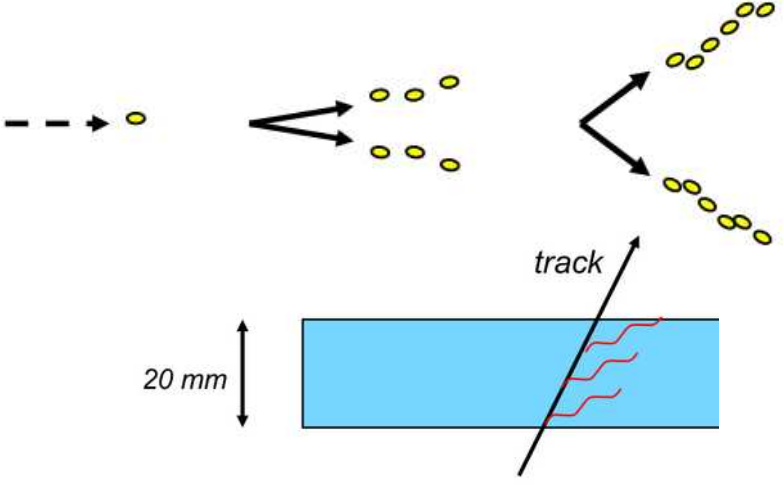
- Did not have a lot of experience with data generation
- Focused more on detector performance and determining optimal selection criteria
    - Sacrificed self-sufficiency for quick progress
    - Planned to come back to learn it later, suppose that worked out
- Will allow for more control over each step of future research

Thank you!

Highlights of Some Things I Learned in B2SW 2022 @ ISU

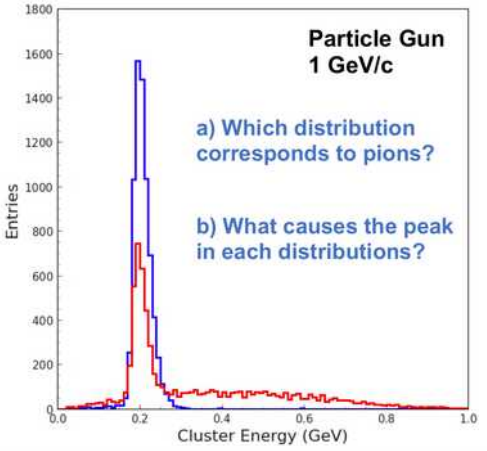
- Tracking and PID (Soeren Prell)
  - Curlers happen at < 250 MeV
    - 300 MeV due to energy loss
  - < 100 MeV don't reach CDC
  - Quencher gas in CDC absorbs photons, prevents uncontrolled discharges
  - No standalone PXD pattern recognition
  - Kalman filter for track fits
- PID (Alan Schwartz)
  - Cherenkov angle and photon yield varies a lot in particularly in our momentum range
  - TOP mirrors focus parallel photons

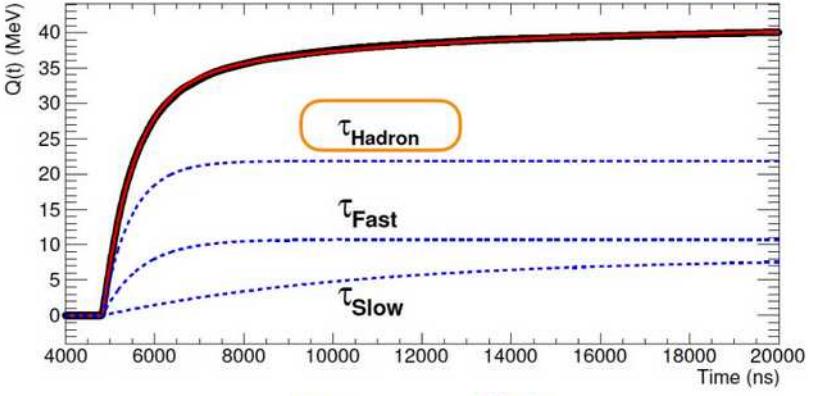




Calorimetry (Savino Longo)

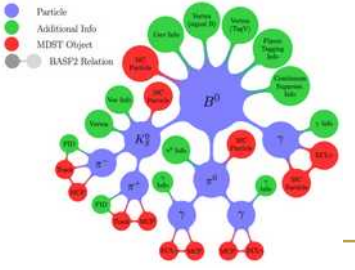
- MIP tracks passing through ECL crystals deposit 200 MeV
- ECL crystal depth is ~16 radiation lengths
- Crystals don't point directly at IP, so particles traversing gaps highly unlikely
- Hadronic shower composition varies a lot
  - Prob. of pion interaction in 30 cm CsI ~50%
- There is a 3rd scintillation time dependent on particle types
  - present for hadrons, absent for muons
  - PSD can help PID



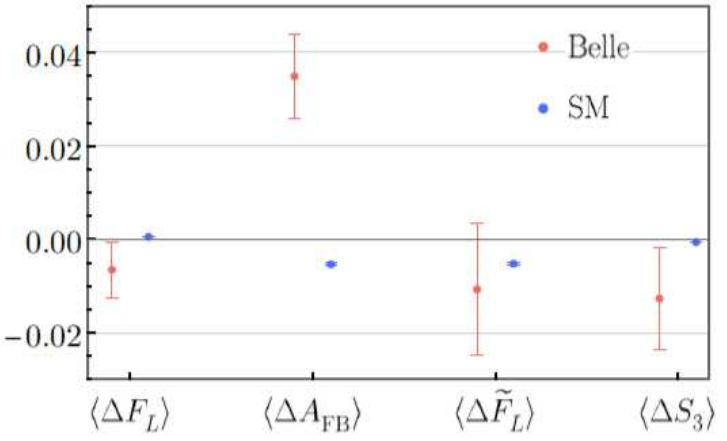


Data Production (Jake Bennett)

- Nobody is using uDSTs
- Self-produced MCs not publishable



- Hints of NP (Tom Browder)
  - 4 sigma deviation in Delta AFB (B->c l nu)
  - In EWPs: QM interference between gamma / Z^0 likely responsible for NP
  - Also, all heavy (t, W, Z) particle appear here
- Belle II Overview (Leo Piilonen)
  - Exotic particles are appearing strictly in the p-wave excitations
  - Background yield ~4x higher for up and charm than down and strange quarks!
- Template Fitting (Markus Prim)
  - How to handle systematic errors versus correlated errors in MLE fits
  - Plus initiated nice offline discussion with Markus about binning choices and fitting multiple backgrounds



Cross sections @ $\Upsilon(4S)$	
$e^+e^- \to b\bar{b}$	1.1 nb
$\to c\bar{c}$	1.3 nb
$\to s\bar{s}$	0.3 nb
$\to d\bar{d}$	0.3 nb
$\to u\bar{u}$	1.4 nb
$\to \tau^+\tau^-$	0.9 nb