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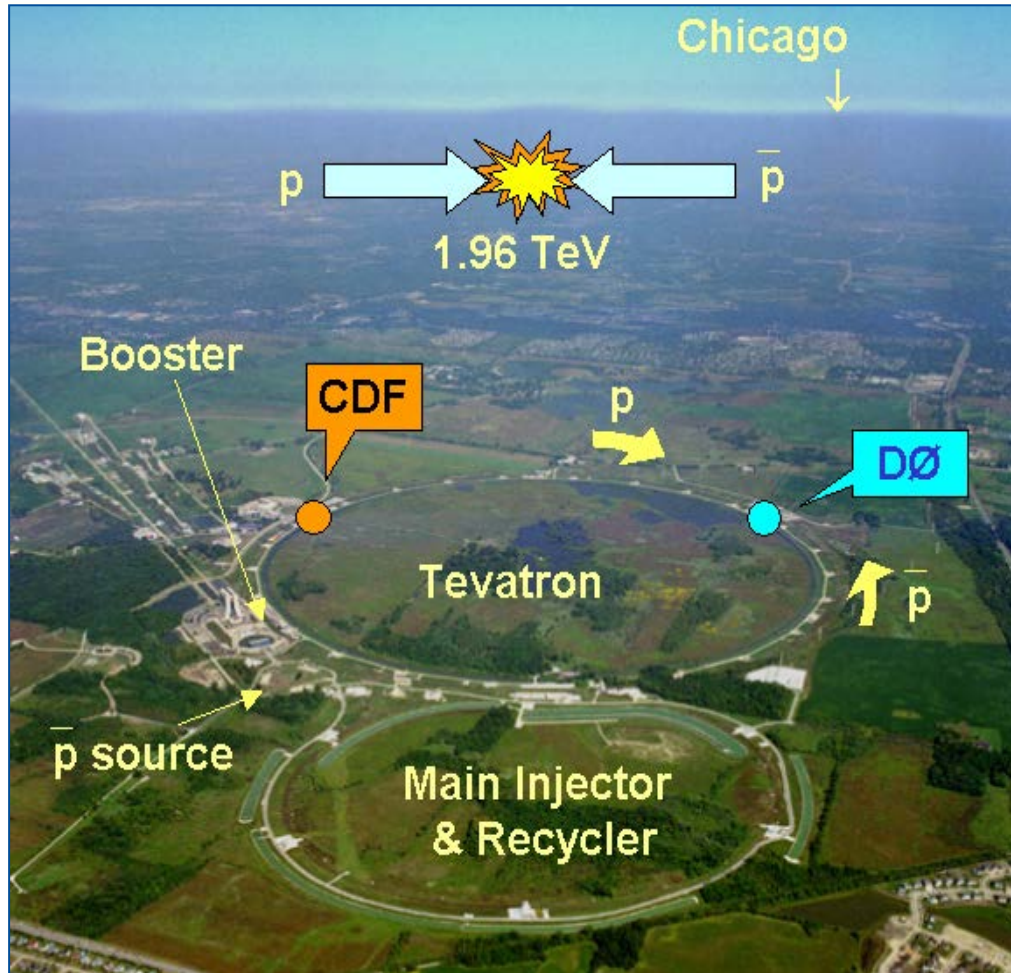
Marj Corcoran at the DZero Experiment at Fermilab's Tevatron

Dmitri Denisov, Spokesperson of the DZero Experiment, Fermilab
Symposium and Memorial in Honor of Marj Corcoran

April 26, 2017



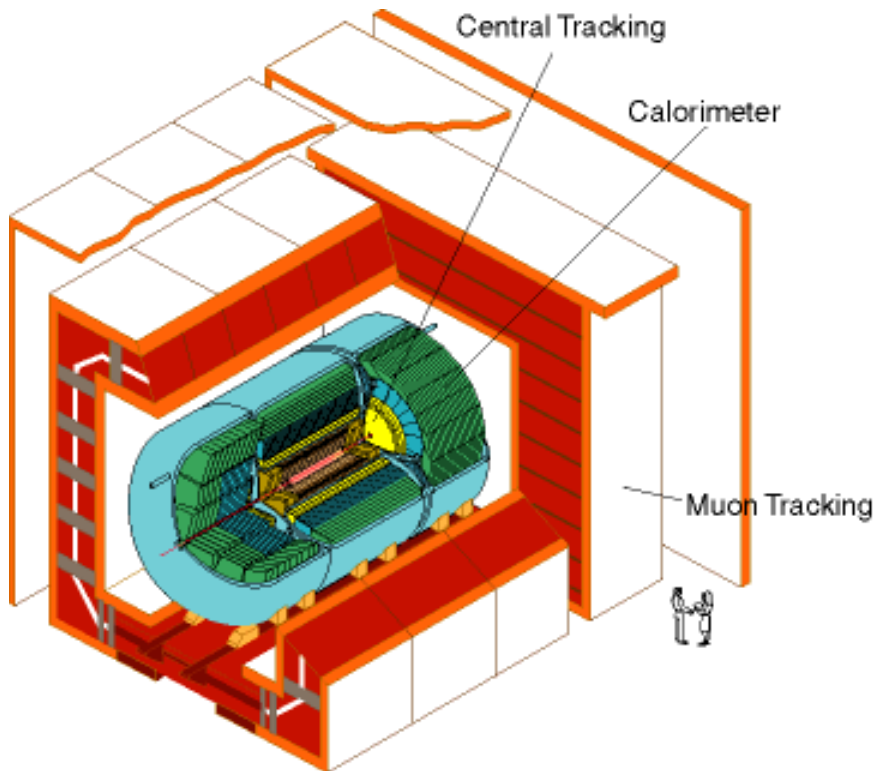
Tevatron Collider at Fermilab



Unique collider at 2 TeV center-of-mass energy colliding protons and anti-protons and leading energy frontier for 25 years



The DZero Experiment



5,500 tons, 3 story high detector to capture products of high energy collisions with millions of detection channels analyzing over 20 millions interactions per second

The DZero Collaboration



DZero collaboration is ~500 scientists from 18 countries joining to study energy frontier proton-antiproton collisions at the Tevatron





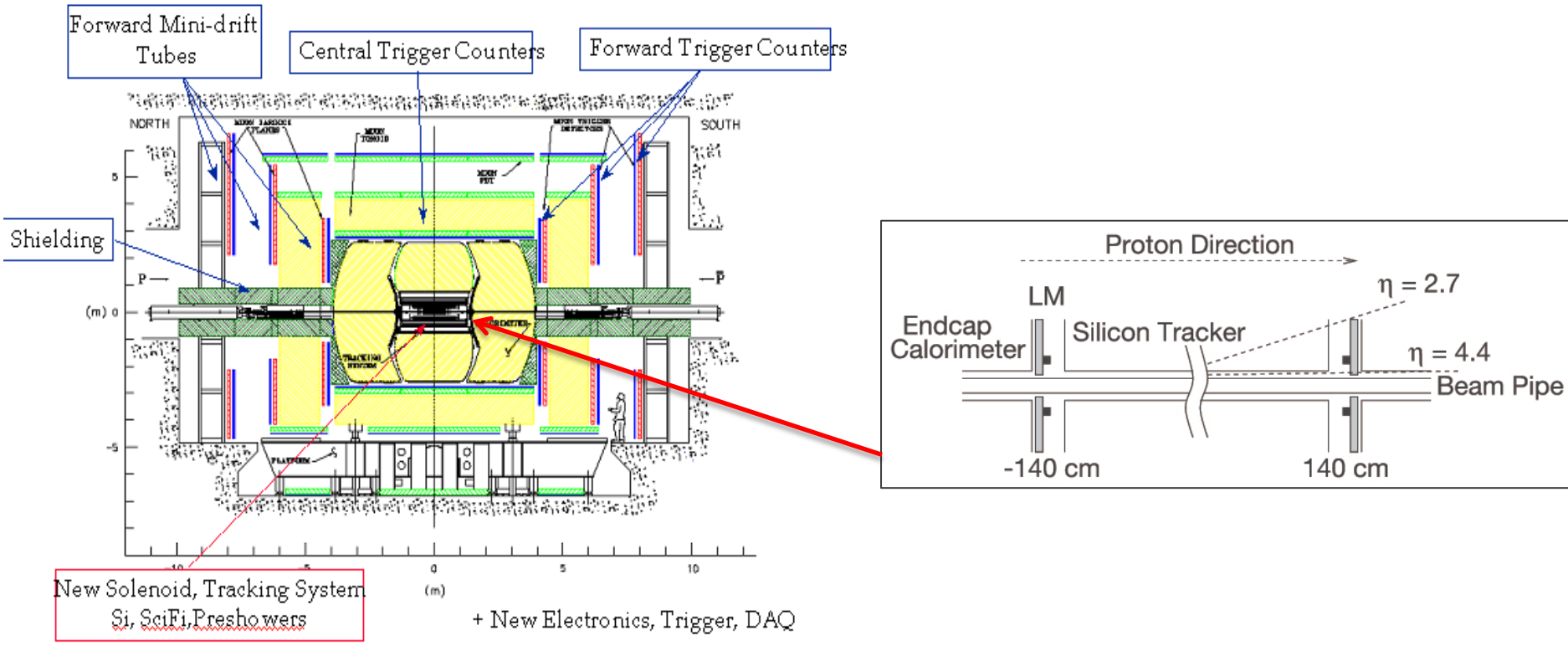
Marj joined the DZero experiment early in Run II which started in 2001



DZero Experiment Highlights

- About 490 papers and 500 Ph.D. theses to date
- Discovery of the top quark and measurement of its properties
- Evidence for Higgs boson production
- Precision measurement of W boson mass
- Observation of vector boson pair production
- Measurement of the oscillation frequency of neutral B_s mesons
- Anomalous di-muon production asymmetry
- Strong interaction production of jets, vector bosons and bosons to test QCD
- Numerous searches for new phenomena

Marj Joining the DZero Experiment



- Marj quickly became invaluable member of the experiment
 - Concentrating on the most critical experiment activities
 - Measuring “luminosity” – intensity of proton-anti-proton collisions

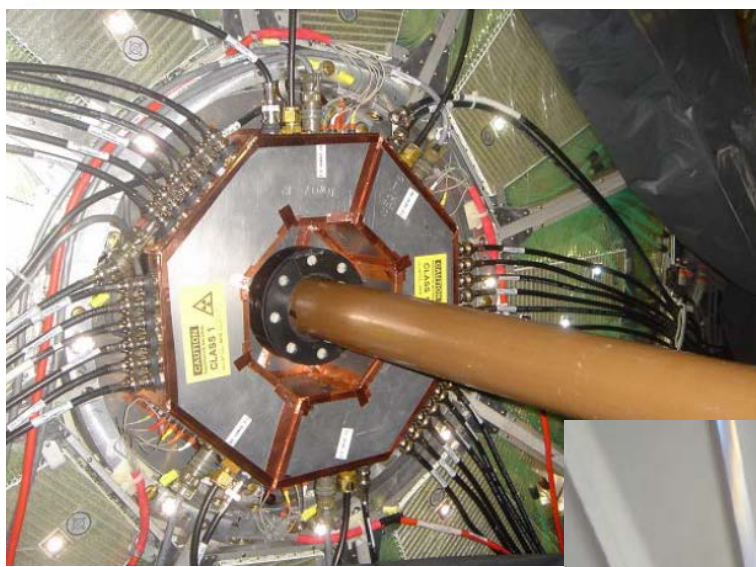


Marj in the Heart of the DZero Detector



Many challenges surfaced at high luminosity: CDF and DZero luminosities were not equal, high radiation loads, complex corrections required...

Luminosity Counters Aging Saga



- By ~2008 we observed “deterioration” of the luminosity detectors performance
- Marj and her group led understanding of the issue and replacement of aging scintillators



Marj Major Contributions to the Luminosity System



D0note 5559 V3.1

Determination of the RunIIb Luminosity Constants Brendan Casey, Marj Corcoran, Yuji Enari, Michelle Prewitt, Greg Snow

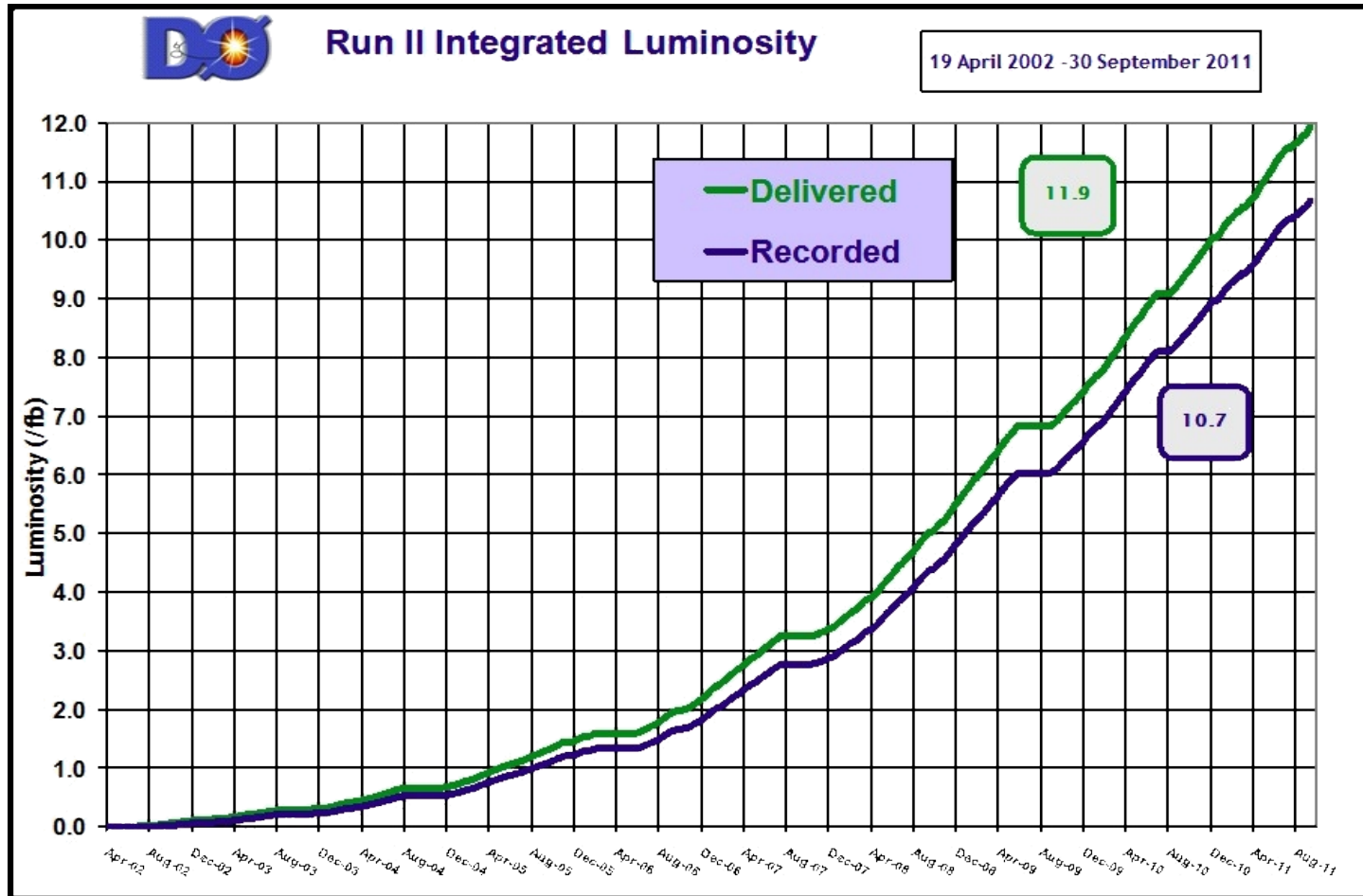
Abstract

We have determined the D0 luminosity constants for the RunIIb era. The techniques used are derived from the previous determination of the RunIIa constant, as detailed in D0 note 4958. We determine the RunIIb effective inelastic cross section $\sigma_{eff} = 48.3 \pm 0.5$ mb, where the error is statistical only. This number is to be compared to the previous result of 48.0 ± 2.6 mb, where the error in this case includes both statistical and systematic error. The single-sided cross section (needed for multiple-interaction corrections) for RunIIb is determined to be $\sigma_{SS} = 9.14 \pm 0.11$ mb, to be compared to the RunIIa value of $\sigma_{SS} = 9.35 \pm 0.13$ mb, where both errors are statistical only.

- Internal DZero note indicating most critical authors
- This publication was one of the most referenced in Run II
 - Every analysis has to indicate number of interactions analyzed

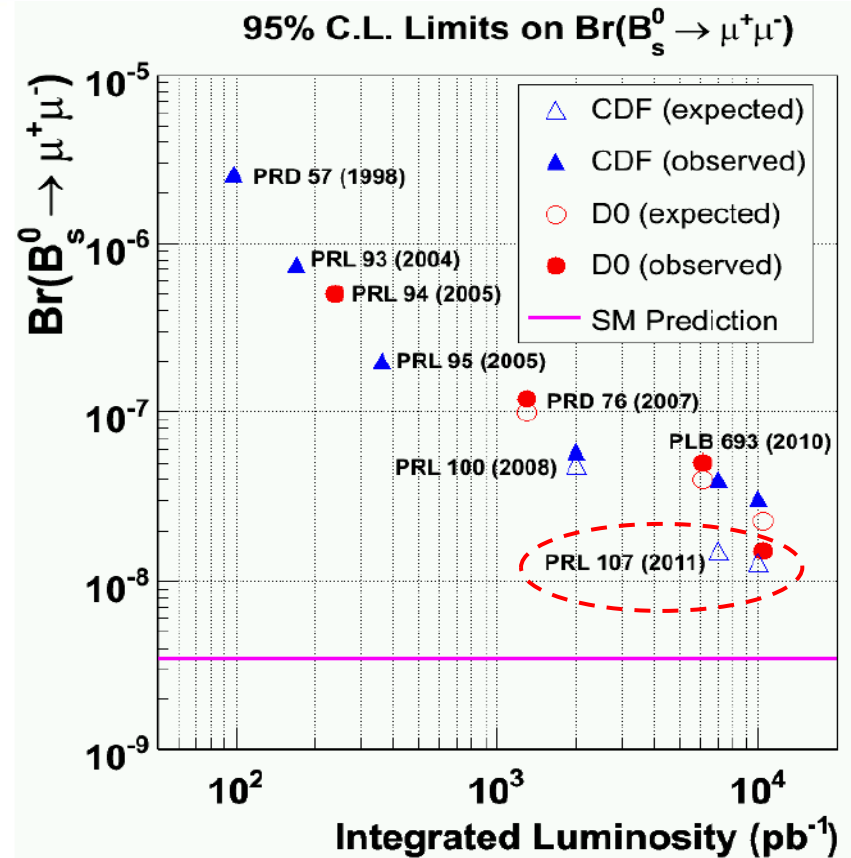
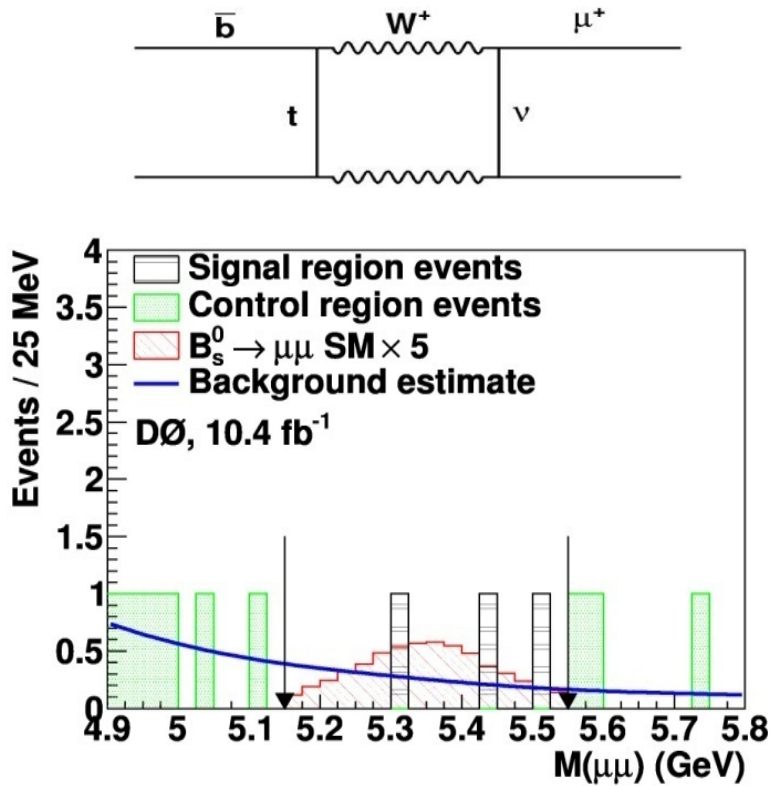


The Most Often Shown DZero Plot



Delivered and integrated luminosities was the main “currency” of the experiments at the Tevatron

B_s to $\mu\mu$ Decay Studies



- B_s to $\mu\mu$ decay was searched for a long time – one of the best ways to discover “new physics”
- Marj brilliant ideas and hard work with her students and postdocs pushed the limit to the lowest value, before the decay, at its predicted value, was observed at the LHC



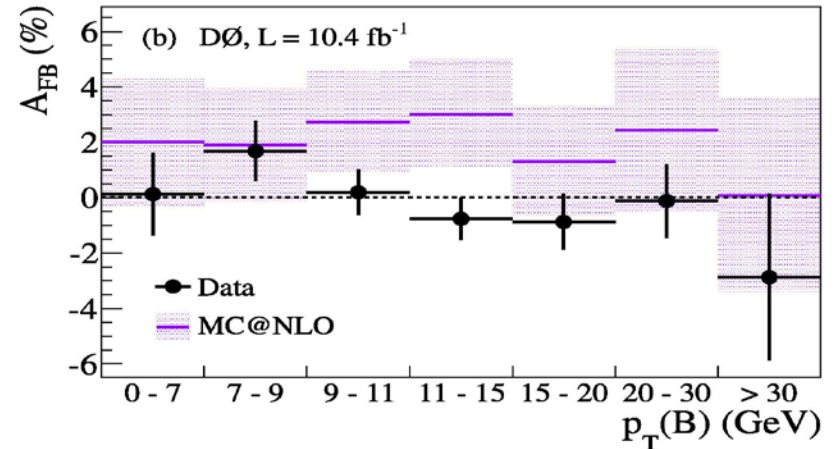
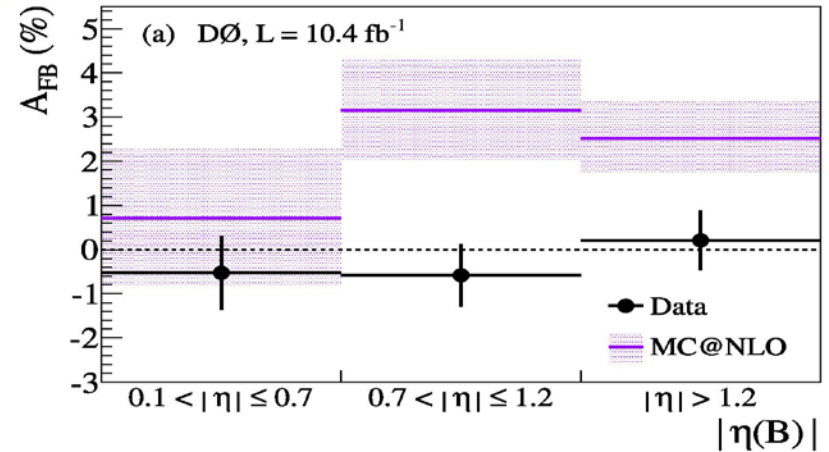
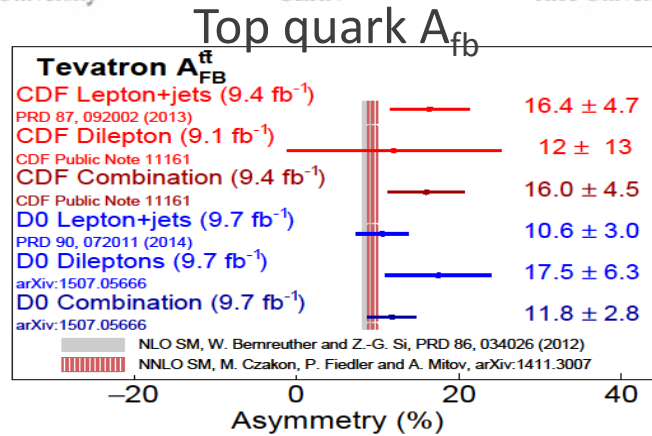
b-quark Production Asymmetry



Julie Hogan
Rice University

Mark Williams
CERN

Marj Corcoran
Rice University

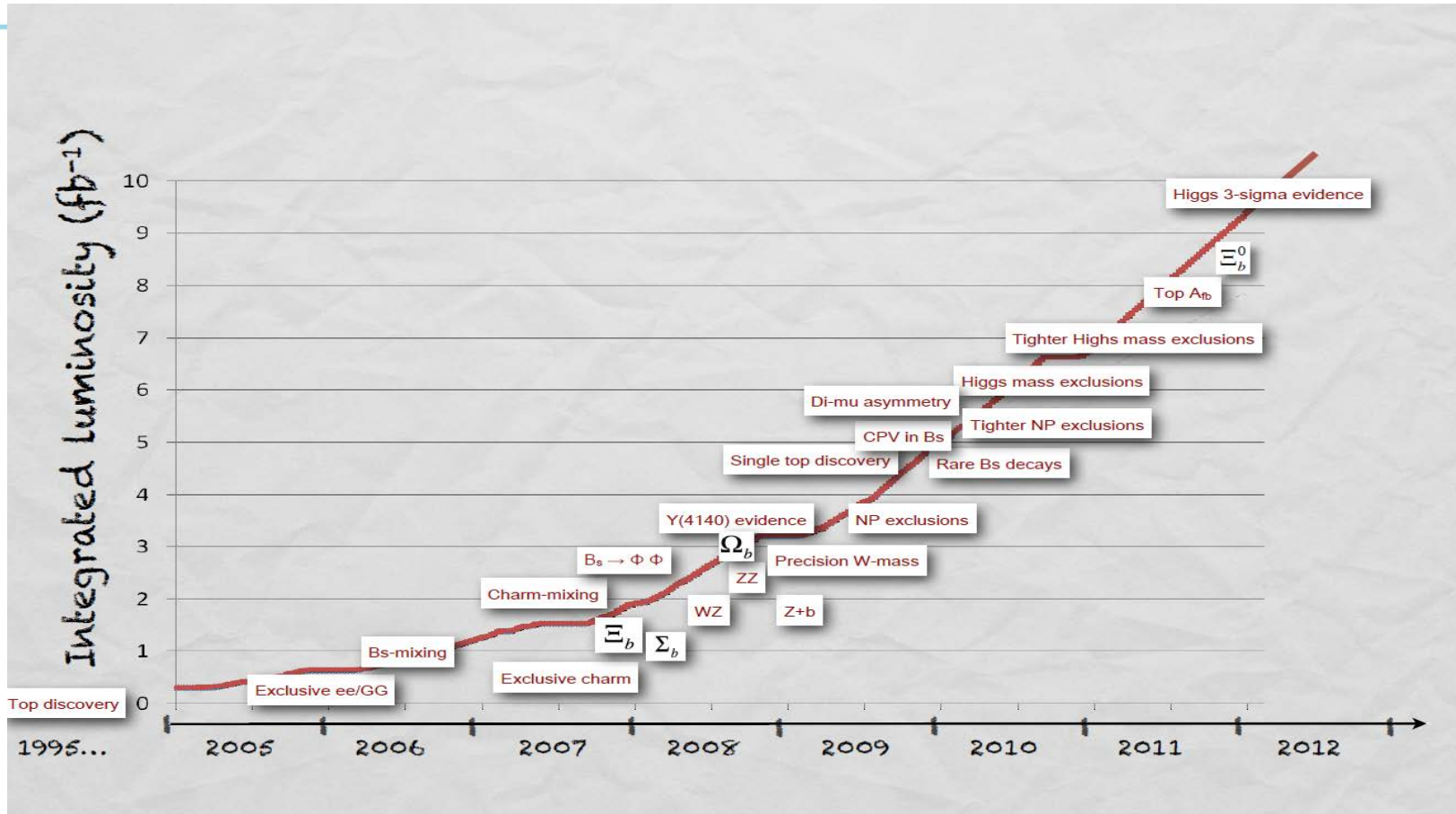


- Top quark A_{fb} “disagreement” stimulated many new ideas
- Marj was as always clear and practical – let’s look for b-quarks asymmetry – Same principles govern these quarks as well
- Marj was leading the DZero heavy flavor group from 2012 to 2017





Tevatron Program at a Glance



Marj's contributions are invaluable to practically all areas: luminosity, heavy flavor, WW pairs, forward-backward asymmetry and the Higgs hunting!

Collaboration Meeting Prague 2008



Marj was always active and passionate member of the experiment



Collaboration Meeting at Fermilab in 2009



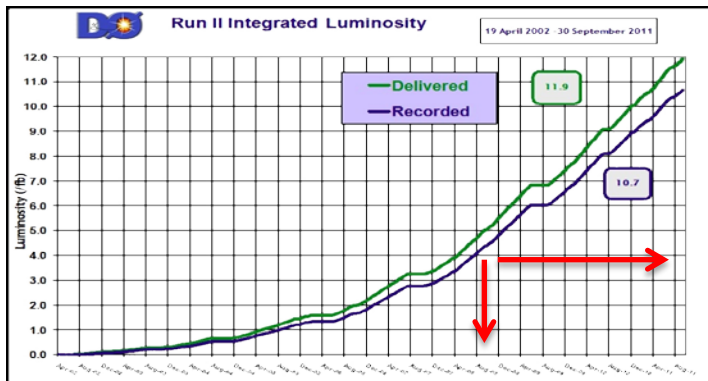
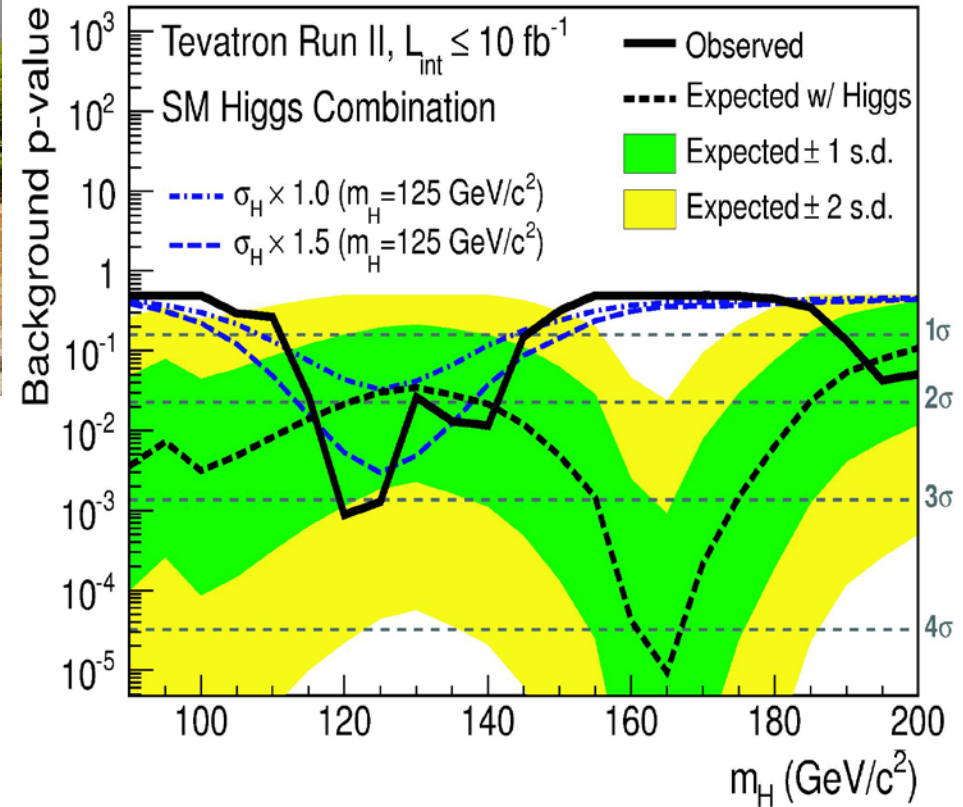
Tevatron Run Extensions and Higgs Race



2012 Lancaster Workshop



Evidence of the Higgs Boson Production at the Tevatron



- In 2008-2009 Marj served as a Chair of DZero Institutional Board – governing body of ~80 DZero institutions
- Marj contributed greatly to the Tevatron Run extension from 2008 to 2011



Marj Leading Education and Outreach



The DZero Collaboration
86 Institutions
495 Researchers
19 Countries



The DZero Collaboration Spans the Globe

Working hard, in various capacities, to extend Tevatron run

Marj's DZero Graduate Students and Postdocs



Jesus Orduna



Julie Hogan



Michelle Prewitt



Avdhesh Chandra



The DØ Collaboration



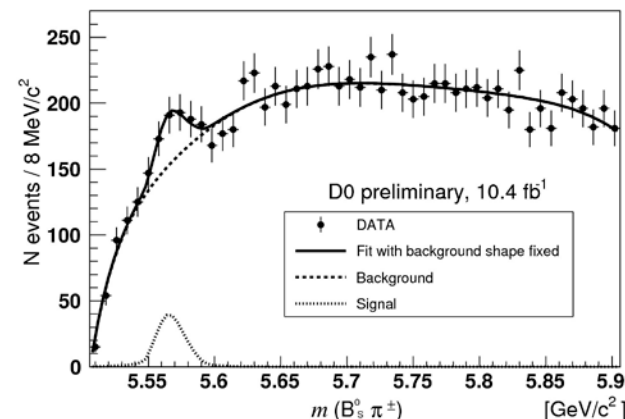
In Memory of Marj Corcoran



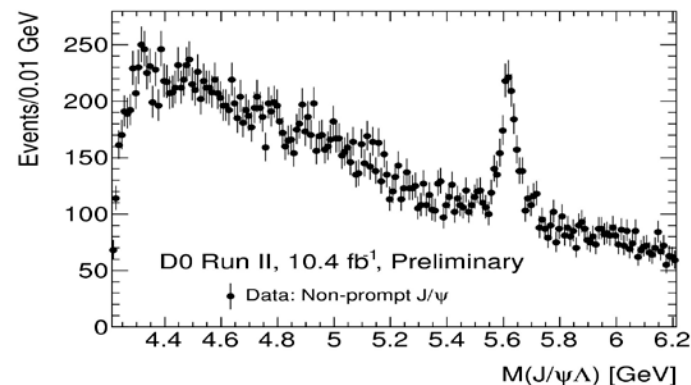
**Our D0 Colleague, Friend, and
co-Leader of the D0 HF/QCD Group**

Recent Tevatron Results - Peter H. Garbincius - Fermilab - 28 April 2017

Confirmation of X(5568) state
in semi-leptonic channel



Search for J/ψ Λ Resonances



Epilogue

Marj was a talented physicist, an accomplished leader and a dedicated mentor. She brought a calm and principled outlook to DZero. We will continue to appreciate her lasting impact on the life of the experiment and our continuing high-quality physics results should be our contribution to her lasting legacy.

