Final Report: Contract No. DE-AC02-85ER40193, and continuation
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The above contract/grant supported research in experimental high-energy physics at the Fermi National Accelerator Laboratory, and recently the US participation in the LHC experiments at CERN in Geneva, Switzerland.

The program began with our being founding members in E-740 at Fermilab, a search for a quark-gluon plasma in proton-antiproton collisions at 1.8 TeV GeV at the Tevatron Collider. This was the first experiment performed at the new Tevatron Collider, which remains the highest energy machine in the world. Ten papers were published in Nuclear Instruments and Methods, Physical Review Letters, and The Physical Review (see publication list below and references to Anderson et al., Lindsey et al., and Alexopoulos et al..) One PhD and two MS degrees were awarded to three graduate students by Iowa State University. One Postdoctoral Research Associate was employed.

At the conclusion of E-740, we joined the D0 experiment (E-740, upgrade E-823) at the Tevatron Collider. The experiment was designed to give a hermetic and comprehensive detection of hadrons, photons and leptons at the highest attainable luminosity. To date, ninety papers have been published in Nuclear Instruments and Methods, Physical Review Letters, The Physical Review, and Physics Letters (see publication list below and references to Abachi et al. and Abbott et al.) Two PhD degrees and been awarded by Iowa State University, and two graduate students are currently writing their PhD theses. Three Postdoctoral Research associates have been employed.

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Published Papers


17. S. Abachi et al. (D0 Collaboration), "Inclusive $\mu$ and $b$-Quark Production Cross Sections in $p\bar{p}$ Collisions at $\sqrt{s} = 1.8$ TeV" *Phys. Rev. Lett.* **74**, 3548 (1995).

18. S. Abachi et al. (D0 Collaboration), "Search for Squarks and Gluinos in $p\bar{p}$ Collisions at $\sqrt{s} = 1.8$ TeV" *Phys. Rev. Lett.* **75**, 618 (1995).


20. S. Abachi et al. (D0 Collaboration), "Limits on the Anomalous $ZZ\gamma$ and $Z\gamma$ Couplings in $p\bar{p}$ Collisions at $\sqrt{s} = 1.8$ TeV" *Phys. Rev. Lett.* **75**, 1028 (1995).

22. T. Alexopoulos et al. (E-735 Collaboration), "Multiplicity Dependence of Transverse Momenta Spectra of Centrally Produced Hadrons on p $\bar{p}$ Collisions at 0.3 TeV, 0.54 TeV, 0.9 TeV, and 1.8 TeV Center-of-Mass Energy." Phys. Lett. B336, 599 (1995).


33. S. Abachi, et al. (D0 Collaboration), "Search for Right-Handed W Bosons and Heavy W' in p $\bar{p}$ Collisions at $\sqrt{s}= 1.8$ TeV", Phys Rev Letts. 76, 3271 (1996).


35. S. Abachi, et al. (D0 Collaboration), "J/$\psi$ Production in p $\bar{p}$ Collisions at $\sqrt{s}= 1.8$ TeV", Phys. Letts, B370, 239 (1996).


41. S. Abachi, et al. (D0 Collaboration), "Limits on Anomalous WWγ Couplings from \( \bar{p} \rightarrow Wγ + X \) Events at \( \sqrt{s} = 1.8 \) TeV", *Phys. Rev. Letts* 78, 3634 (1997).
42. S. Abachi, et al. (D0 Collaboration), "Search for Diboson Events with Large Missing Transverse Energy in \( p \bar{p} \) Collisions at \( \sqrt{s} = 1.8 \) TeV", *Phys. Rev. Letters* 78, 2070 (1997).
48. B. Abbott, et al. (D0 Collaboration), "Limits on WWZ and WWγ Couplings from \( p \bar{p} \rightarrow evjjX \) events at \( \sqrt{s} = 1.8 \) TeV", *Phys. Rev. Letters* 79, 1441 (1997).
50. B. Abbott, et al. (D0 Collaboration), "Color Coherent Radiation in Multijet Events from \( p \bar{p} \) Collisions at \( \sqrt{s} = 1.8 \) TeV", *Phys. Lett. B* 414, 419 (1997).
56. B. Abbott, et al. (D0 Collaboration), "Zγ Production in \( p \bar{p} \) Collisions at \( \sqrt{s} = 1.8 \) TeV and Limits on Anomalous ZZγ and Zγγ Couplings", *Phys. Rev. D* 57 Rapid Communications, 3817 (1998).
57. B. Abbott, et al. (D0 Collaboration), "Search for First Generation Scalar Leptoquark Pairs in \( p \bar{p} \) Collisions at \( \sqrt{s} = 1.8 \) TeV", *Phys. Rev. Letters* 80, 2051 (1998).


B. Abbott, et al. (D0 Collaboration) "Search for Bottom Squarks in \(p\bar{p}\) Collisions at \(\sqrt{s} = 1.8\) TeV", *Phys. Rev. D Rapid Comm.* 60, 31101 (1999).


B. Abbott, et al. (D0 Collaboration), "Small Angle Muon and Bottom Quark Production in \(p\bar{p}\) Collisions at \(\sqrt{s}=1.8\) TeV," *Phys. Rev. Lett.* 84, 5478 (2000).


B. Abbott, et al. (D0 Collaboration), "Probing BFKL Dynamics in Dijet Cross Section at Large Rapidity Intervals in \(p\bar{p}\) Collisions at \(\sqrt{s}=1800\) and 630 GeV," *Phys. Rev. Lett.* 84, 5722 (2000).

B. Abbott, et al. (D0 Collaboration), "A measurement of the W→tau nu Production Cross Section in \(p\bar{p}\) Collisions at \(\sqrt{s}=1.8\) TeV," *Phys. Rev. Lett.* 84, 5710 (2000).


96. B. Abbott, et al. (D0 Collaboration), *Limits on Anomalous WW\gamma and WWZ Couplings from WW/WZ → e\nuj Production* *Phys. Rev. D* (62), 052005 (2000)

97. B. Abbott, et al., (D0 Collaboration), *Search for R-parity Violation in Multilepton Final States in p\bar{p} Collisions at sqrt(s)=1.8 TeV* *Phys. Rev. D Rapid. Comm.* (62), 071701 (2000)


100. B. Abbott et al., (D0 Collaboration) *Cross section for b jet production in p\bar{p} collisions at sqrt(s)=1.8 TeV* *Phys. Rev. Lett.* (85) 5068 (2000)

**Accepted Papers**


**Submitted Papers**


3. B. Abbott, et al., (D0 Collaboration), *Ratios of Multijet Cross Sections in p\bar{p} Collisions at sqrt(s)=1800 GeV*
4. B. Abbott, et al., (D0 Collaboration), *Measurement of the Angular Distribution of Electrons from W->e(\nu) Decays Observed in p\bar{p} Collisions at sqrt(s)=1.8 TeV*

5. B. Abbott, et al., (D0 Collaboration), *Differential Cross Section for W Boson Production as a Function of Transverse Momentum in p\bar{p} Collisions at sqrt(s)=1.8 TeV*

6. B. Abbott, et al., (D0 Collaboration), *Inclusive jet production in p\bar{p} collisions*


9. B. Abbott, et al., (D0 Collaboration), *High-pT Jets in p\bar{p} Collisions at sqrt(s)=630 and 1800 GeV*
submitted to Phys. Rev. D {xx} pppp (2001)