

Experimental particle. physics

esipap...
European School of Instrumentation
in Particle & Astroparticle Physics

H3

analysis of
classic experiments

Let's read a paper!

- Form 7 groups (2-3 people, at least 1 PhD with 1 Master student)
- Read the paper!
- Discuss the experimental techniques used to achieve the result:
 - ✓ What accelerator, is any? What detector setup?
 - ✓ How was the signal identified?
 - ✓ What were the major experimental challenges? How were they solved?
- Prepare a short presentation (3 slides max, 5' show time!) where the previous points are discussed
 - ✓ It can be a simple cut-and-paste of the most important plots and/or figures from the paper: don't waste time to write text or to make pretty slides!

What papers?

1942

Measurement of muon decay time

1955

Antiproton discovery

1974

J/Psi discovery

1982

Observation of QCD jets

1983

W boson discovery

1983

Z boson discovery

1995

Top quark discovery

Experimental Determination of the Disintegration Curve of Mesotrons

BRUNO ROSSI AND NORRIS NERESON

Cornell University, Ithaca, New York

(Received September 17, 1942)

The disintegration curve of mesotrons has been experimentally determined by investigating the delayed emission of disintegration electrons which takes place after the absorption of mesotrons by matter. Within the experimental errors, the disintegration curve is exponential and corresponds to a mean lifetime of 2.3 ± 0.2 microseconds.

Observation of Antiprotons*

OWEN CHAMBERLAIN, EMILIO SEGRÈ, CLYDE WIEGAND,
AND THOMAS YPSILANTIS

*Radiation Laboratory, Department of Physics, University of
California, Berkeley, California*

(Received October 24, 1955)

Experimental Observation of a Heavy Particle J/ψ

J. J. Aubert, U. Becker, P. J. Biggs, J. Burger, M. Chen, G. Everhart, P. Goldhagen,
J. Leong, T. McCorriston, T. G. Rhoades, M. Rohde, Samuel C. C. Ting, and Sau Lan Wu
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and

Y. Y. Lee
Brookhaven National Laboratory, Upton, New York 11973
(Received 12 November 1974)

Discovery of a Narrow Resonance in e^+e^- Annihilation*

J.-E. Augustin,† A. M. Boyarski, M. Breidenbach, F. Bulos, J. T. Dakin, G. J. Feldman,
G. E. Fischer, D. Fryberger, G. Hanson, B. Jean-Marie,† R. R. Larsen, V. Lüth,
H. L. Lynch, D. Lyon, C. C. Morehouse, J. M. Paterson, M. L. Perl,
B. Richter, P. Rapidis, R. F. Schwitters, W. M. Tanenbaum,
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and

G. S. Abrams, D. Briggs, W. Chinowsky, C. E. Friedberg, G. Goldhaber, R. J. Hollebeek,
J. A. Kadyk, B. Lulu, F. Pierre,§ G. H. Trilling, J. S. Whitaker,
J. Wiss, and J. E. Zipse
Lawrence Berkeley Laboratory and Department of Physics, University of California, Berkeley, California 94720
(Received 13 November 1974)

Preliminary Result of Frascati (ADONE) on the Nature of a New 3.1-GeV Particle Produced in e^+e^- Annihilation*

C. Bacci, R. Balbini Celio, M. Berna-Rodini, G. Caton, R. Del Fabbro, M. Grilli, E. Iarocci,
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M. Spano, B. Stella, and V. Valente
The Gamma-Gamma Group, Laboratori Nazionali di Frascati, Frascati, Italy

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B. Bartoli, D. Bisello, B. Esposito, F. Felicetti, P. Monacelli, M. Nigro, L. Paolufi, I. Peruzzi,
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G. Barbarino, G. Barbiellini, C. Bemporad, R. Biancastelli, F. Cevenini, M. Celveti,
F. Costantini, P. Lariccia, P. Parascandolo, E. Sassi, C. Spencer, L. Tortora,
U. Troya, and S. Vitale
The Baryon-Antibaryon Group, Laboratori Nazionali di Frascati, Frascati, Italy
(Received 18 November 1974)

Observation of QCD jets

1982

OBSERVATION OF VERY LARGE TRANSVERSE MOMENTUM JETS AT THE CERN $\bar{p}p$ COLLIDER

The UA2 Collaboration

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Received 25 August 1982

EXPERIMENTAL OBSERVATION OF ISOLATED LARGE TRANSVERSE ENERGY ELECTRONS WITH ASSOCIATED MISSING ENERGY AT $\sqrt{s} = 540$ GeV

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Z boson discovery

1983

EVIDENCE FOR $Z^0 \rightarrow e^+e^-$ AT THE CERN $\bar{p}p$ COLLIDER

The UA2 Collaboration

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Received 11 August 1983

EXPERIMENTAL OBSERVATION OF LEPTON PAIRS OF INVARIANT MASS AROUND 95 GeV/c² AT THE CERN SPS COLLIDER

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Observation of Top Quark Production in $\bar{p}p$ Collisions with the Collider Detector at Fermilab
(CDF Collaboration)

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PHYSICAL REVIEW LETTERS

3 APRIL 1995

Observation of the Top Quark
(D0 Collaboration)