50th ANNIVERSARY

NOVEMBER REVOLUTION

11/11/1974 -- 11/11/2024

2 experimental talks at SLAC

changed our understanding of matter

an opened the path to the

STANDARD MODEL

ARE WE HERE TO

CELEBRATE

an achievement

OR TO

COMMEMORATE

an historic event ?

BOTH ARE APPROPRIATE

for this REVOLUTION

WHY CELEBRATE ANNIVERSARIES ???

1. Pre-revolutionary particle physics

   QED - weak - strong

2. Revolutionary changes

   3-quarks → 6 quarks

   2-charged fermions - 3 charged fermions

3. Lust for supersymmetry & strings

   effective field theories

Pre-revolutionary Particle physics

50+ years after the formulation of quantum mechanics led to the gradual separation of theorists from experimentalists

Bj's pre-revolution Clutter List

nuclear democracy

Regge poles

dispersion theory

field-current identities

chiral dynamics

$Su(6)_w$ / U(12)

Mandelstam representation

strings

LSZ

current algebra

bootstrap

field algebra

vector dominance

Melosh transformation

light-cone current algebra

Kallen-Lehman representation

flavor groups

Wightman axioms

Quotes from the July 1974 London Conference

"It is clear there is no consensus among theoreticians working on e^+e^- annihination"

John Ellis

"This subject is of particular interest at the present time, because the results of recent experiments flatly contradict all previous models of hadron production available up to half a year ago"

Burt Richter

JUST BEFORE The Event

Sunday Nov. 10 meeting → Ting
Panofsky, Richter - Shared Data

Some key people - Drell, Jackson
Bjorken ...

SPECIAL PRESENTATION SCHEDULED

"Bj, I think you had better go to the lab now" J. Bjorken

"As the name 'revolution' implies, the discoveries changed our understanding of the structure of matter" F. Gilman

"What could possibly be so important that he needs to call a press conference?"
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The Event

Two experimental talks in the SLAC auditorium on Monday, November 11, 1974

Sam Ting
MIT - BNL

$p\,Be \rightarrow e^+e^-(Q)\,X$

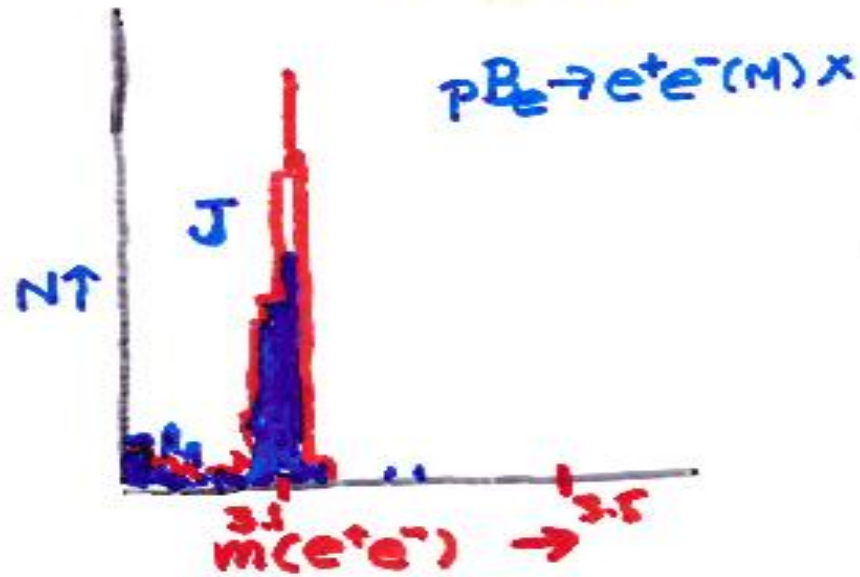
peak J(3.1) GeV

Roy Schwitters
SLAC - Berkeley

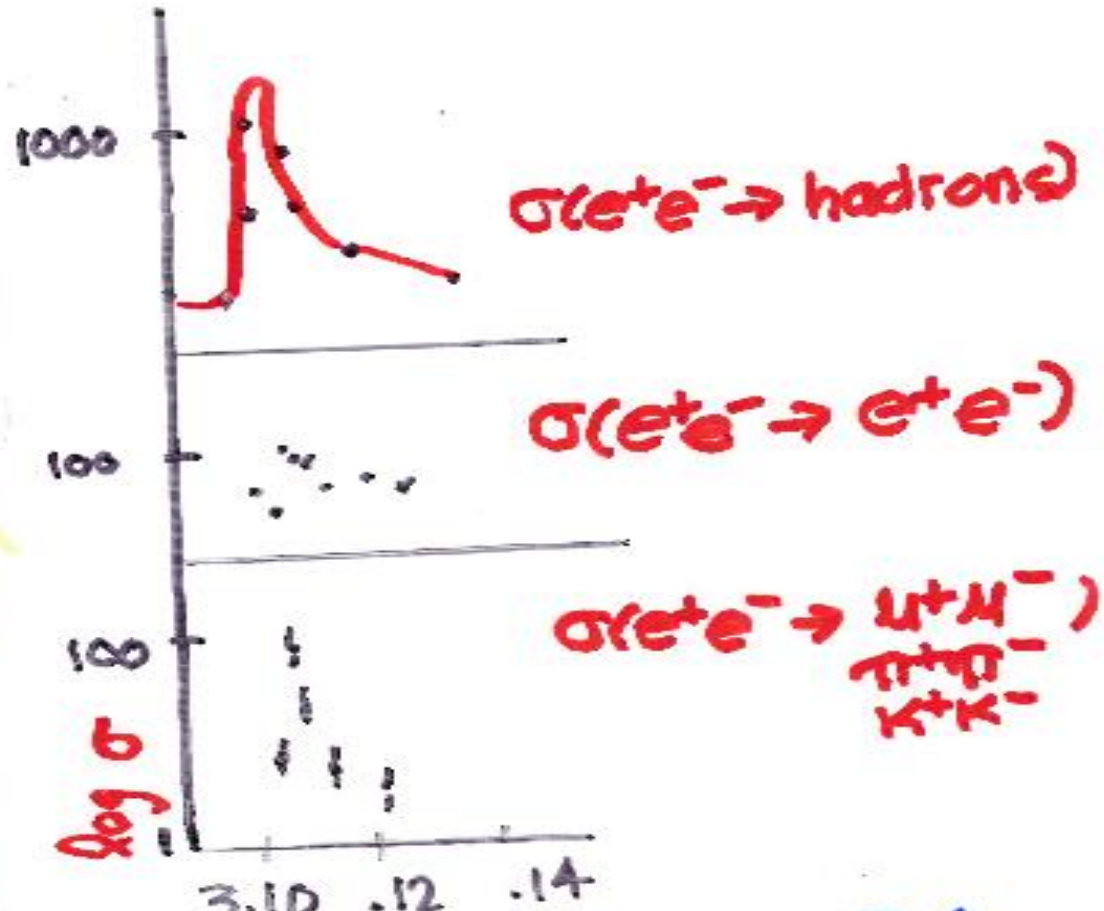
$e^+e^- \rightarrow$ hadrons(Q)

peak ψ(3.105) GeV

The Nobel winning Data



MIT - BNL
TING et. al



SLAC - BERKELEY
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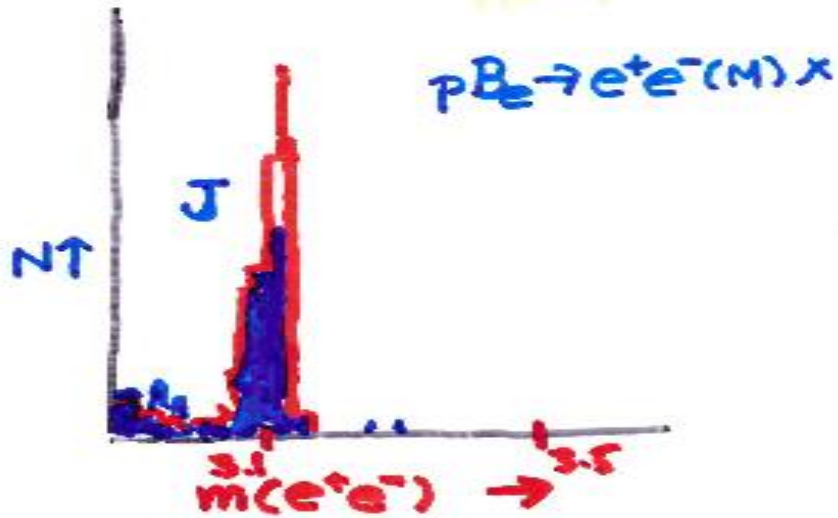

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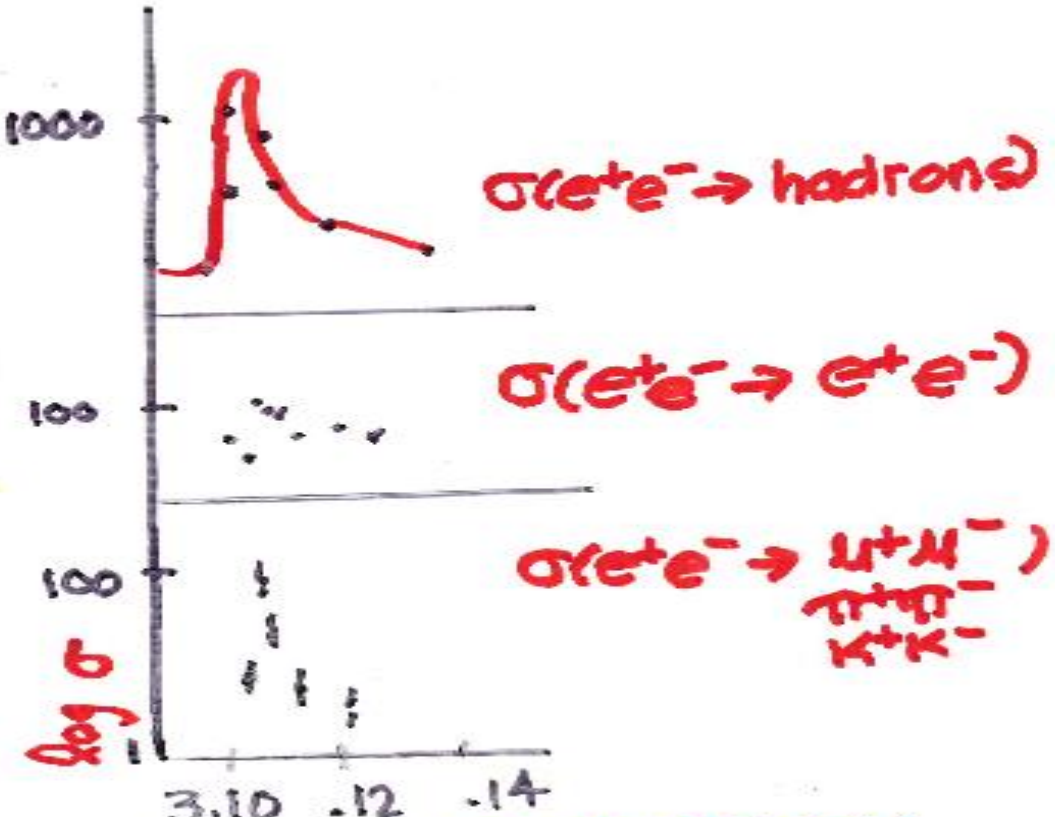


SLAC - BERKELEY
Richter et. al

JUST AFTER The Event

The crowd at Slac left the talks to jump on the phones to pass on the NEWS

Theory Group formed 3 packs

1. J. Bjorken -- QED & Data Corrections
2. S. Drell -- Theoretical Interpretation
3. D. Blankenbeclar -- pN & γN production

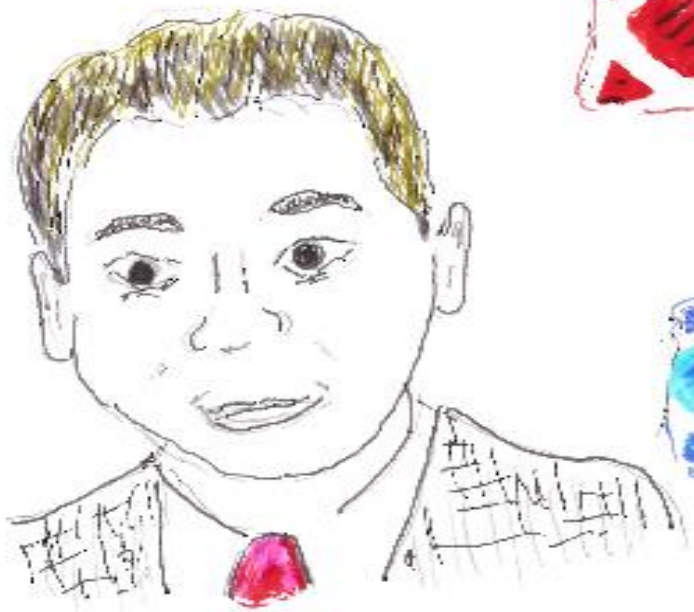
2 week long work shop

The Tools that led to estimates of the masses of the c-quark & b-quark

also led to the super symmetric pairing of standard model partners

The hope of finding a theory that included gravity

led to super-string theorists



Sam Ting

Burt Richter

SLAC National Accelerator Laboratory

SLAC-PUB-1636
August 1975
(T/E)

HADRONIC MODELS FOR THE PHOTOPRODUCTION OF ψ's*

Dennis Sivers and John Townsend
Stanford Linear Accelerator Center
Stanford University, Stanford, California 94305

and

Geoffrey West
Los Alamos Scientific Laboratory
Los Alamos, New Mexico 87544

ABSTRACT

We examine the photoproduction of the $\psi(3095)$ within the context of the assumption that it contains a pair of new fundamental constituents. Using an inequality based on unitarity, we derive a lower limit on the cross section

$$\sigma(\gamma p \to p\bar{D} + \text{anything}) \geq 300 \text{ nb}$$

where the D's are hadrons carrying the new constituent bound to ordinary quarks. This suggests it should be possible to detect D's from their hadronic decays in γ beams. Combining the unitarity relation for $\gamma p \to \psi p$ and $\psi p \to \psi p$, we predict corrections to the vector dominance hypothesis so that $\sigma_{tot}(\psi p)$ is about a factor of two larger than observed. We discuss briefly the precision necessary for experiments on nuclear targets to test this prediction.

(Submitted to Phys. Rev.)

*Supported by U. S. Energy Research and Development Administration.

75-12-62

Quantum # density
asymmetries --
arXiv: 1106.3947
10.1103/PRD.85.014034
PhyRev

I. INTRODUCTION

Recent measurements of ψ photoproduction at Cornell,[1] SLAC[2] and FNAL[3] have clarified and sharpened our understanding of the properties of the new particles. It is particularly significant that experimental measurements of the pseudoelastic cross section

$$d\sigma/dt(\gamma p \to \psi p)$$

are larger than the upper limit implied by nonhadronic models for the ψ-particles.[4] This supports the idea that the ψ-particles experience the strong interactions and in this paper, we will adopt the most popular of the strong interaction models for the new particles. We will assume that the ψ and ψ' are bound states of a quark-antiquark pair carrying a new quantum number. For convenience, we will call this quantum number charm but our results are more general than the usual SU_4 model.

The fundamental prediction of the generalized charm model for the $\psi(3100)$ and $\psi(3700)$ is the existence of new hadrons carrying a conserved quantum number. As this is being written, there is as yet no conclusive experimental evidence of these charmed hadrons but there are a number of indirect indications they might exist.[5] We intend to explore the implications for ψ photoproduction of the existence of these new particles. Our results are insensitive to the symmetry group in which the new particles are classified[6] and to their decay modes. The properties we do assume for these particles are as follows:

1. They are massive. The meson masses begin in the range of 2 GeV. This value is approximately determined by the narrow width of the $\psi(3100)$ and $\psi(3700)$ and the location of the "threshold" rise in $R = \sigma(e^+e^- \to$

FURTHER STUDY

BOOKS

The Hunting of the Quark
Michael Riordan 1987

Grace in all Simplicity
Bob Cahn & Chris Quigg 2024

Articles

The November Revolution
Fred Gilman SLAC Beam Line 1/1985

A Theorist Reminisces
J. D Bjorken SLAC Beam Line 7/1985

A November Revolution
Frank Close Cern Courier 12/2004

The Revolution tha shook particle physics
Suzanne Jacobs Technology Review 10/2014

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BURT RICHTER

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