Photon-photon dans les anneaux de stockage électron-positron
3-4 sept. 1973, Collège de France (Paris)
-

P.Kessler and the CdF group:
N. Arteaga, C.Carimalo,
J.Parisi

- Not only photon-photon but since 1997 Photon + interactions etc.

- Not in only e+e- but in pp, pA etc.

On The Storage Ring.

The following is a very sketchy proposal for the construction of a storage ring in Frascati. No literature

At this stage it appears necessa[ry] to define the project a little better: I prefer to think of [it] as an experiment rather than as a machine - a fact which may [prob]ably our attitude to the project. As I think [to] demonstrate the project is closer to an experim[ent] in two important respects: in cost and in applicability of the ironware. Talking of [cost] I propose to study the reactions

(1) $e^+ + e^- \rightarrow 2\gamma$ (A); $\rightarrow \mu^+ + \mu^-$ (B); $\rightarrow \pi^+\pi^-(2\pi^0)$ (C)

and I admit that I think that there is nothing else of importance, which can be studied with the same set up.

The first of the processes listed is two quantum annihilation. The process is predominantly backward-forward in the C.M. system and in these preferred directions no 'radiative corrections' are to be expected. The cross section for this process is

(2) $\sigma(A) = 6.3.10^{-30}\ cm^2$

at 250 Mev and it diminishes a little less than quadratically with rising energy.

I propose to use (1A) as a monitoring process. This is a

(3)

tive beam, the luminosity L is given by

$$L = N_1 N_2 \left(\frac{\sigma}{q}\right) \frac{c}{u} \cdot \frac{s}{u} \cdot \eta$$

B. Touschek Rome-Frascati february 1960

B.Touschek,
Rome, 9.Nov.60.

A D O N E - a Draft Proposal for a Colliding Beam Experiment.

It is proposed to construct a synchrotron like machine capable of accelerating simultaneously electrons and positrons in identical orbits. The suggested maximum energy is 1.5 Gev for the electrons as well as the positrons. This energy allows one to produce pairs of all the so called 'elementary particles' so far known, with the exception of the neutrino, which only becomes accessible via a weak interaction channel.

It is assumed that experiments in which there are only two particles in the final state are most easy to interpret. There are 16 such reactions, namely:

(1) 2γ . This is the only reaction in which the ~~rank~~ intermediate state is 'quasi real' and in which therefore there should be no 'radiative corrections'. This reaction should serve as a 'monitor'. The cross-section is $2.6\ 10^{-31}$ cm^2.

(2) e^+, e^- . This reaction will show strong angular variations and may require 'good geometry'. It would give information on the brakdown of electrodynamics at distances corresponding to about 1/3 the Comptonwavelength of the proton.

(3) μ^+, μ^- . Test of electrodynamics in 'bad geometry'. May also serve as an indication of the fundamental difference between electrons and muons.

(4) $\pi^+ \pi^-$ reveals the interaction between pions in odd parity states.

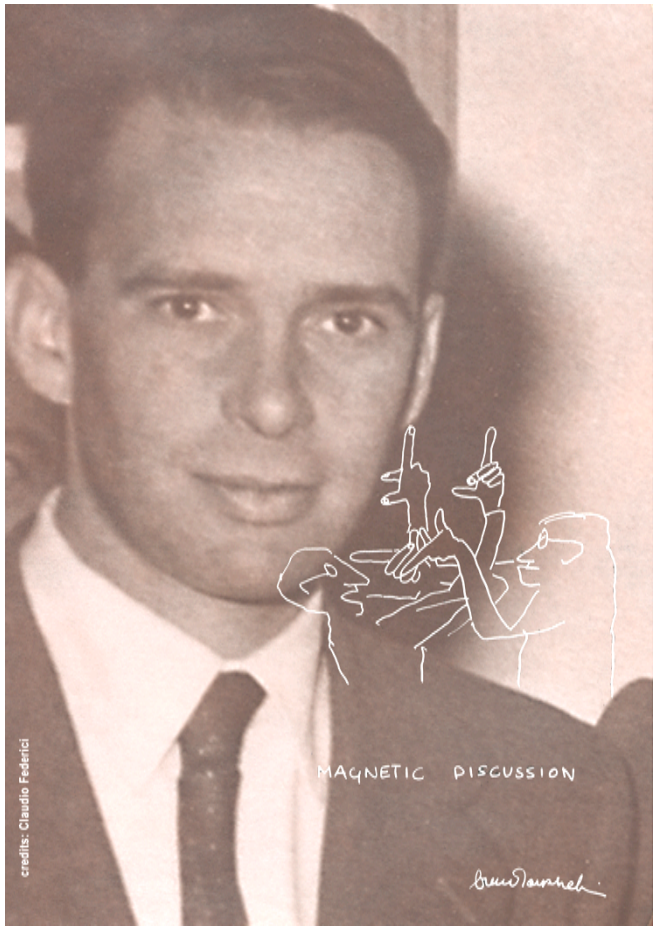
(5) $2\pi^0$: charge exchange interaction for pion-pion scattering.

(6) $K^+ K^-$: interaction of K-mesons in odd parity states.

(7) $\bar{K}^0, K^0$: Charge exchange interaction between K-mesons.

(8) $p, \bar{p}$: interaction of proton and antiproton in even parity odd charge parity states.

(9) $n, \bar{n}$: same as (8) but for the charge



IL NUOVO CIMENTO VOL. XXXIV, N. 6 16 Dicembre 1964

AdA in Frascati and Orsay: 1960-64

March 1963:

-Touschek effect is discovered and published in PRL

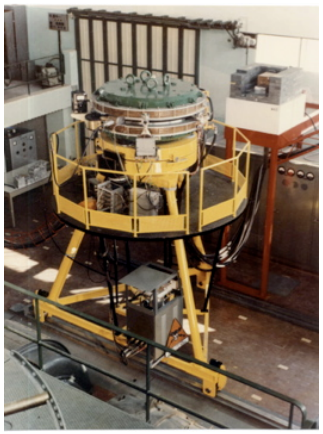
1963-64

-Measurements are taken of

$$e^+e^- \rightarrow e^+e^-\gamma$$

-Data are compared with theoretical calculations by Altarelli and Buccella (thesis work with Raul Gatto)

-The rate is in agreement with the theoretical calculations and Touschek's effect: collisions are proved.



Measurements of the Rate of Interaction between Stored Electrons and Positrons (*).

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J. HAISSINSKI and P. MARIN
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B. TOUSCHEK
Istituto Nazionale di Fisica Nucleare - Sezione di Roma

(ricevuto il 16 Luglio 1964)

Summary. — The paper describes a series of experiments carried out with the purpose of observing the γ-rays produced in the collision between stored beams of electrons and positrons. The interaction rate has been measured and was found to be in good agreement with the hypothesis that there is a complete overlap between the two beams and that the dimensions of the beams are those calculated from the lifetime effect

In 1971 experimental evidence for photon-photon collisions was found at ADONE and VEPP2

LNF-71/63
23 Settembre 1971

C. Bernardini: RESULTS ON e^+e^- REACTIONS AT ADONE (1.4 - 2.4 GeV).

(Presented at the 1971 International Symposium on Electron and Photon Interactions at High Energies - Cornell, Ithaca).

TABLE I - Group Labels, Names of Authors, Analyzed final states.

Group	e^+e^-	$\mu^+\mu^-$	$\gamma\gamma$	$2e^+2e^-$	$\pi^+\pi^-(K^+K^-)$	$p\bar{p}$	≥ 3 had
BCF(1)	x	x			x		x
Boson(2)	x						x
$\gamma\gamma$(3)			x	x			x
$\mu\pi$(4)	x	x		(x)	x		x
$p\bar{p}$(5)						x	

From Photon 2015 in Novosibirsk, by Elena Pakhtusova

Evidence for two-photon production of e^+e^- pairs at VEPP-2

1 – One of our colleagues Vladimir Balakin suggested that the observed events are from the $e^+e^- \rightarrow e^+e^- e^+e^-$ process , which was first discussed by Landau and Lifshitz in 1934.

2 – Vladimir Baier and Victor Fadin obtained the differential cross section for this process (Phys. Lett. 35B, 156, 1971).

3 - Good agreement between their calculation and experimental results validated the hypothesis on the process nature.

4 – In particular, the experimental and calculated distribution of the asimuthal discollinearity angle $\Delta\varphi$ for $|\Delta\theta| < 40$ is shown in the figure. It is seen that observed distribution well agrees with calculation, taking into account the multiple scattering and geometry of experiment.

For comparison the dashed line corresponds to independent and isotropic particle distribution.

5 – The article with the results of this experiment was published in journal Physics Letters in 1971.

Evidence for electron-positron pair electroproduction
V.E. Balakin, A.D. Bukin, E.V. Pakhtusova, V.A. Sidorov, A.G. Khabakhpashev,
Phys.Lett. B34 (1971) 663-664

LETTERE AL NUOVO CIMENTO VOL. 3, N. 18 29 Aprile 1972

Gamma-Gamma Interaction Processes at Adone e^+e^- Storage Ring. Measurement of the Reaction $e^+ + e^- \to e^+ + e^- + e^+ + e^-$.

C. BACCI, G. PENSO and G. SALVINI

Istituto di Fisica dell'Università - Roma
Istituto Nazionale di Fisica Nucleare - Sezione di Roma

R. BALDINI-CELIO, G. CAPON, C. MENCUCCINI,
G. P. MURTAS, A. REALE and M. SPINETTI

Laboratori Nazionali del CNEN - Frascati

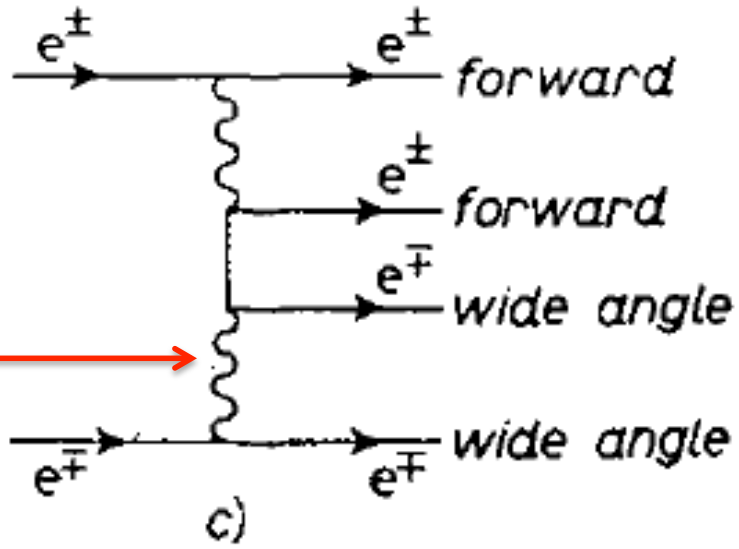
B. STELLA (*)

Istituto Tecnico Industriale «Enrico Fermi» - Frascati

(ricevuto il 16 Marzo 1972)

Gamma gamma at ADONE

- The explored energies per beam were
  - 950 MeV
  - 970 MeV
  - 1050 MeV
- Hard photon propagator events were observed
- Some non showering tracks also observed ->



$$e^+e^- \rightarrow e^+e^-\gamma\gamma \rightarrow e^+e^-\mu^+\mu^-$$

$$e^+e^- \rightarrow e^+e^-\mu^+\mu^-$$ 1974

VOLUME 32, NUMBER 7 PHYSICAL REVIEW LETTERS 18 FEBRUARY 1974

Muon Pair Production by Photon-Photon Interactions in e^+e^- Storage Rings

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Laboratori Nazionali del Comitato Nazionale per l'Energia Nucleare, Frascati, Rome, Italy

and

F. Ceradini, M. Conversi, S. d'Angelo, M. L. Ferrer, L. Paoluzi, and R. Santonico
Istituto di Fisica dell'Università di Roma and Sezione di Roma dell'Istituto Nazionale di Fisica Nucleare, Rome, Italy

(Received 10 December 1973)

The photon-photon interaction has been investigated by e^+ and e^- collisions at about 2.7-GeV total energy. Evidence based on 34 well-identified events has been obtained for the process $e^+e^- \rightarrow e^+e^-\mu^+\mu^-$, hitherto unobserved. Such a process is found to occur in agreement with theoretical predictions based on the equivalent-photon approximation. Results on 74 events from the process $e^+e^- \rightarrow e^+e^-e^+e^-$ are also reported.

Electron colliding beams provide a means, at present unique, for investigating the photon-photon interaction at high energy, as pointed out by many authors.[1] In the present experiment the outgoing e^+,$^-$ are detected at very small angles with respect to their incident directions, in coinci-

From Frederic Kapusta, Photon 2013 in Paris

1973-2013 : a bit of history

Colloque international sur les collisions photon-photon
dans les anneaux de stockage électron-positron
3-4 sept. 1973, Collège de France (Paris)

Liste des revues d'EDP Sciences

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Rechercher Recherche avancée S'identifier comme abonné

1872-1962
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J. Phys. Radium
J. Phys. Phys. Appl.

1963-1990
J. Phys.
J. Physique Lett.
J. Phys. Colloques
J. Phys. Phys. Appl.
Rev. Phys. Appl. (Paris)

1991-2006
J. Phys. I France
J. Phys. II France
J. Phys. III France
J. Phys. IV France

Current journals
The European Physical Journal

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Le Journal de Physique Colloques

Vol. 35 No. C2 (Mars 1974)

Colloque international sur les collisions photon-photon dans les anneaux de stockage électron-positron / International colloquium on photon-photon collisions in electron-positron storage rings

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  G. SALVINI
  Abstract | PDF file (479.5 KB)

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  V. A. SIDOROV
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  p. C2-21

The 1973 Conference

F.Kapusta Photon 2915

Le Journal de Physique Colloques
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Photon 2021?