

Few recollections: Guido from Adone to DAΦNE

The old times at Adone

Guido moves to CERN

DAΦNE: a high-luminosity ϕ factory

Filippo Ceradini – Dipartimento di Matematica e Fisica



Few recollections: Guido from Adone to DAΦNE

The old times at Adone

Guido moves to CERN

DAΦNE: a high-luminosity ϕ factory

But it began earlier, Guido's master thesis:

Laboratori Nazionali di Frascati

LNF-60/3 (Febr. 1960)

G. Barbiellini: PRODUZIONE DI COPPIE DI ELETTRONI E DI BREMS-
STRAHLUNG, DA PRIMARI DI ALTA ENERGIA, IN MONOCRISTALLI
(Tesi di Laurea).

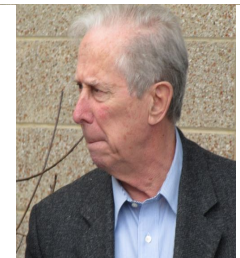
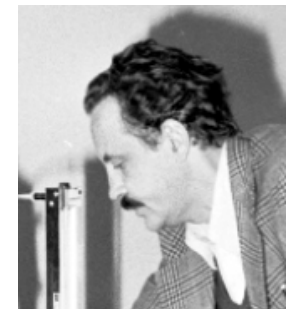
December '68 - Filippo begins his master thesis

Il Maestro: Marcello Conversi

The instructors: Mario Bertino
Armando Pecchi
Giovanni Nicoletti

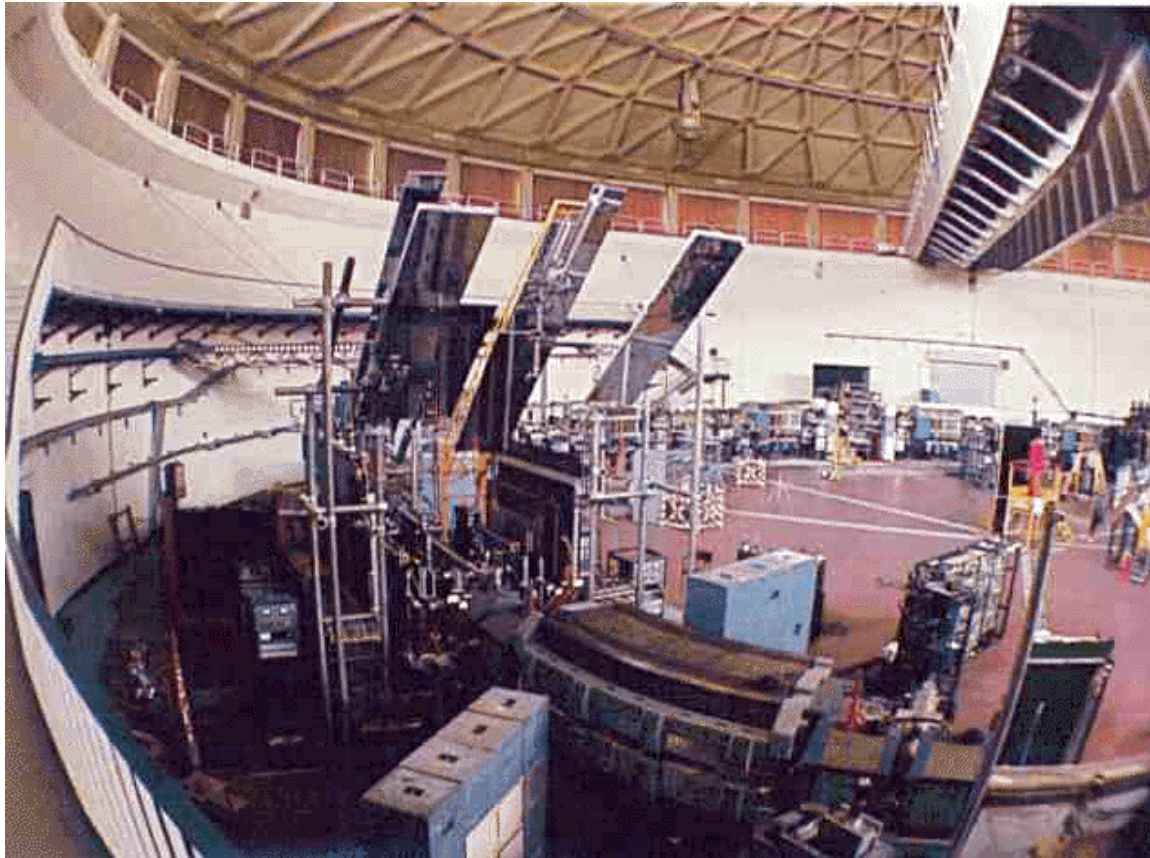
The teachers: Guido Barbiellini
Luciano Paoluzi
Roberto Visentin
Piero Spillantini
Rinaldo Santonico

The students: Miro Preger
Walter Scandale
Filippo



October 1969 - Adone finally works!

ADONE hall during the installation of the experiments



The experiments:
all two-particle names

$\gamma\gamma$

$\pi\pi$

$\mu\mu$

$\rho\bar{\rho}$

The $\mu\pi$ experiment

Volume 35B, number 4

PHYSICS LETTERS

7 June 1971

TEST OF QUANTUM ELECTRODYNAMICS BY BHABHA SCATTERING IN THE GeV REGION

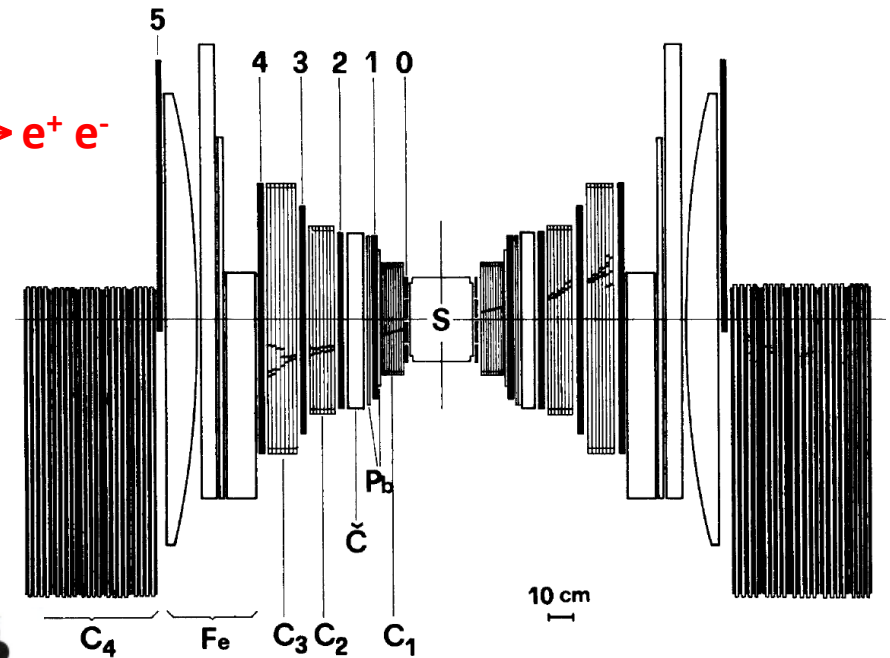
B. BORGIA, F. CERADINI, M. CONVERSI, L. PAOLUZI, W. SCANDALE
Istituto di Fisica dell'Università di Roma and Sezione di Roma dell'INFN, Roma, Italy

G. BARBIELLINI*, M. GRILLI, P. SPILLANTINI, R. VISENTIN
Laboratori Nazionali del CNEN, Frascati (Roma), Italy

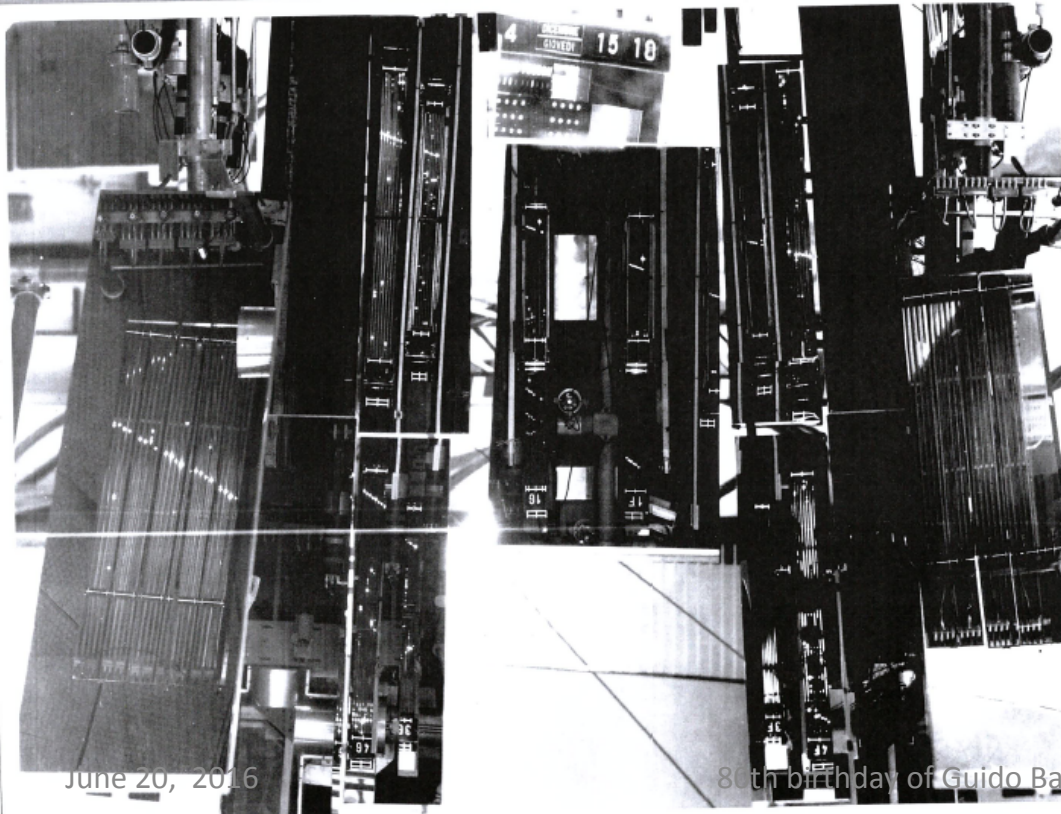
and

A. MULACHIÈ
Istituto di Fisica dell'Università di Padova and Sezione di Padova dell'INFN, Padova, Italy

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



Thursday December 4, 1969, 15:18



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

LETTERE AL NUOVO CIMENTO

VOL. 3, N. 3

15 Gennaio 1972

Muon Pair Production by Electron-Positron Collisions in the GeV Region.

B. BORGIA, F. CERADINI, M. CONVERSI, L. PAOLUZI and R. SANTONICO

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

G. BARBIELLINI, M. GRILLI, P. SPILLANTINI and R. VISENTIN
Laboratori Nazionali del CNEN - Frascati

F. GRIANTI
Istituto Nazionale di Fisica Nucleare - Sezione di Genova

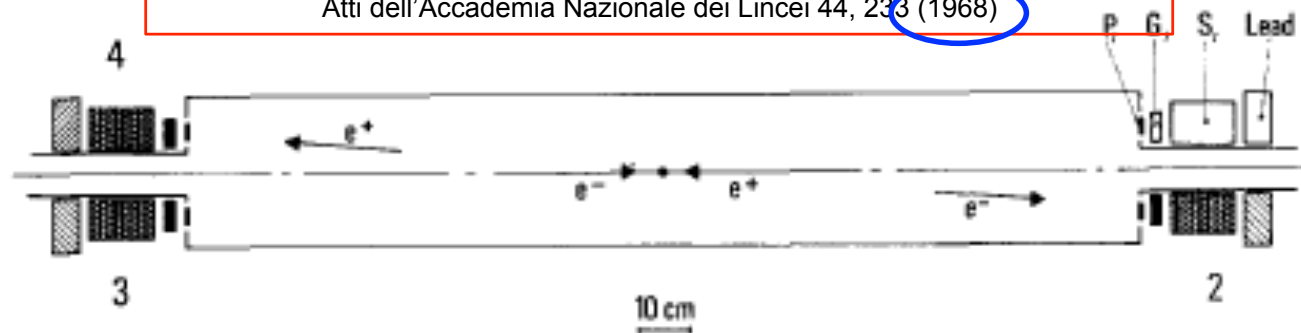
(ricevuto il 30 Settembre 1971)

The first invention: the luminometer

A monitoring system to measure the absolute luminosity
of a machine operating with $e^+ e^-$ colliding beams

Guido Barbiellini, Bruno Borgia, Marcello Conversi, Rinaldo Santonico

Atti dell'Accademia Nazionale dei Lincei 44, 233 (1968)



STORAGE RING LUMINOSITY MEASUREMENTS BY SMALL ANGLE $e^+ e^-$ SCATTERING

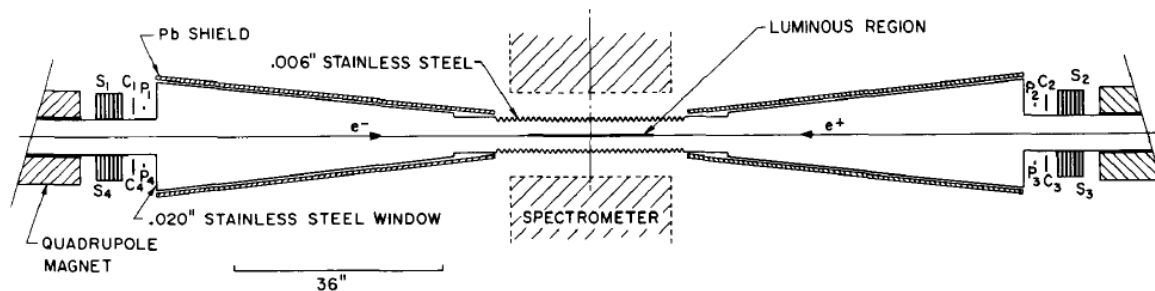
GUIDO BARBIELLINI

Laboratori Nazionali del CNEN, Frascati (Roma), Italy

FILIPPO CERADINI, LUCIANO PAOLUZI and RINALDO SANTONICO

Istituto di Fisica, Università di Roma; Istituto Nazionale di Fisica Nucleare, Sezione di Roma, Roma, Italy

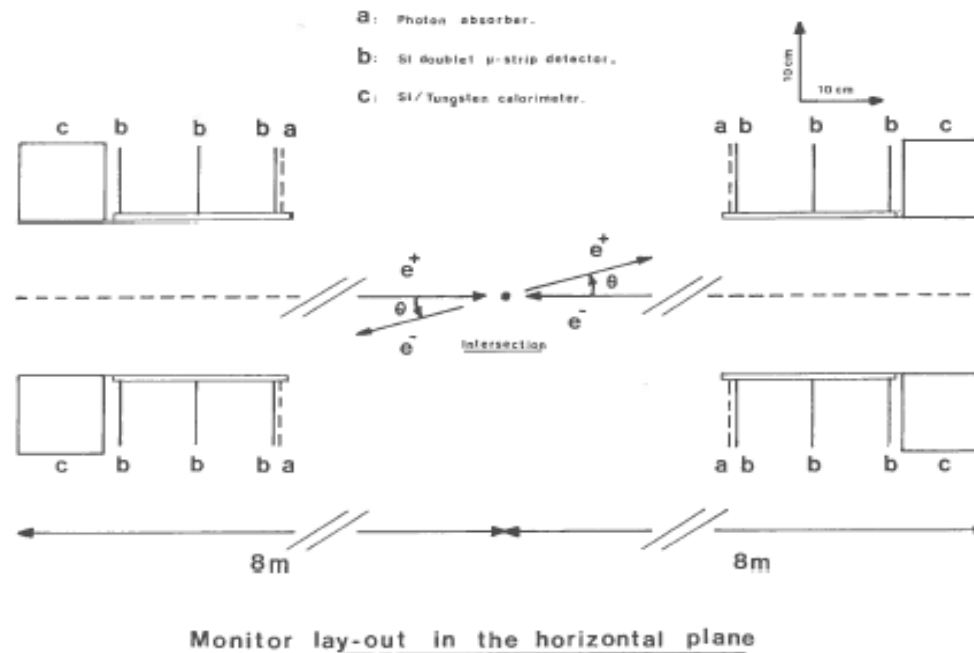
Copied for all e^+e^- colliders, this is the version of SPEAR



15 years later: the design of a luminometer à la LEP

INFN/TC-83/15
20 Settembre 1983

G. Barbiellini, G. Cecchet, J. Y. Hemery, F. Lemeilleur,
P. G. Rancoita, A. Seidman and M. Zilka: SILICON/TUNGSTEN
CALORIMETER AS LUMINOSITY MONITOR



Something strange: a discovery!

While checking the 80mm photographs Giovanni and Mario found something strange: too many tracks!
they asked Guido: what can be?

Volume 42B, number 4 PHYSICS LETTERS 25 December 1972

MULTIPLICITY IN HADRON PRODUCTION BY e^+e^- COLLIDING BEAMS

F. CERADINI and R. SANTONICO
Istituto di Fisica dell'Università di Roma; Roma, Italy

M. CONVERSI and L. PAOLUZI
Istituto di Fisica dell'Università di Roma and Sezione di Roma dell'INFN; Roma, Italy

M. GRILLI, E. IAROCCHI, P. SPILLANTINI, V. VALENTE and R. VISENTIN
Laboratori Nazionali del CNEN; Frascati (Roma), Italy

M. NIGRO
Istituto di Fisica dell'Università di Padova and Sezione di Padova dell'INFN; Padova, Italy

Received 26 October 1972

Volume 47B, number 1 PHYSICS LETTERS 15 October 1973

MULTIHADRON PRODUCTION IN e^+e^- COLLISIONS UP TO 3 GeV TOTAL C.M. ENERGY

F. CERADINI, M. CONVERSI, S. D'ANGELO,
L. PAOLUZI and R. SANTONICO
*Istituto di Fisica dell'Università di Roma, Italy
and Sezione di Roma dell'INFN, Roma, Italy*

and

R. VISENTIN
Laboratori Nazionali del CNEN, Frascati, Italy

Received 7 August 1973

Hadron Production in e^+e^- Collisions (*)

N. CABIBBO
*Istituto di Fisica dell'Università - Roma
Istituto Nazionale di Fisica Nucleare - Sezione di Roma*

G. PARISI and M. TESTA
Istituto di Fisica dell'Università - Roma

(ricevuto il 30 Maggio 1970)

Hadron Pair Production by Electron-Positron Colliding Beams (*).

G. BARBIELLINI, M. GRILLI, E. IAROCCHI, P. SPILLANTINI
V. VALENTE and R. VISENTIN

Laboratori Nazionali del CNEN - Frascati, Roma

F. CERADINI, M. CONVERSI, S. D'ANGELO, G. GIANNOLI
L. PAOLUZI and R. SANTONICO

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

M. NIGRO

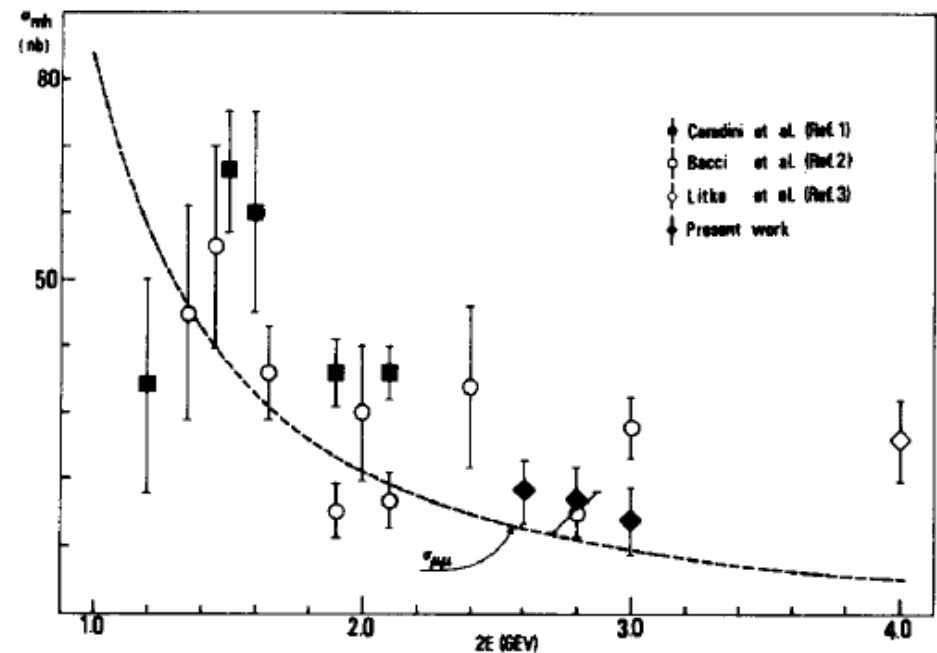
*Istituto di Fisica dell'Università - Padova
Istituto Nazionale di Fisica Nucleare - Sezione di Padova*

L. TRASATTI and G. T. ZORN

Department of Physics and Astronomy, University of Maryland - College Park, Md.

(ricevuto il 17 Gennaio 1973)

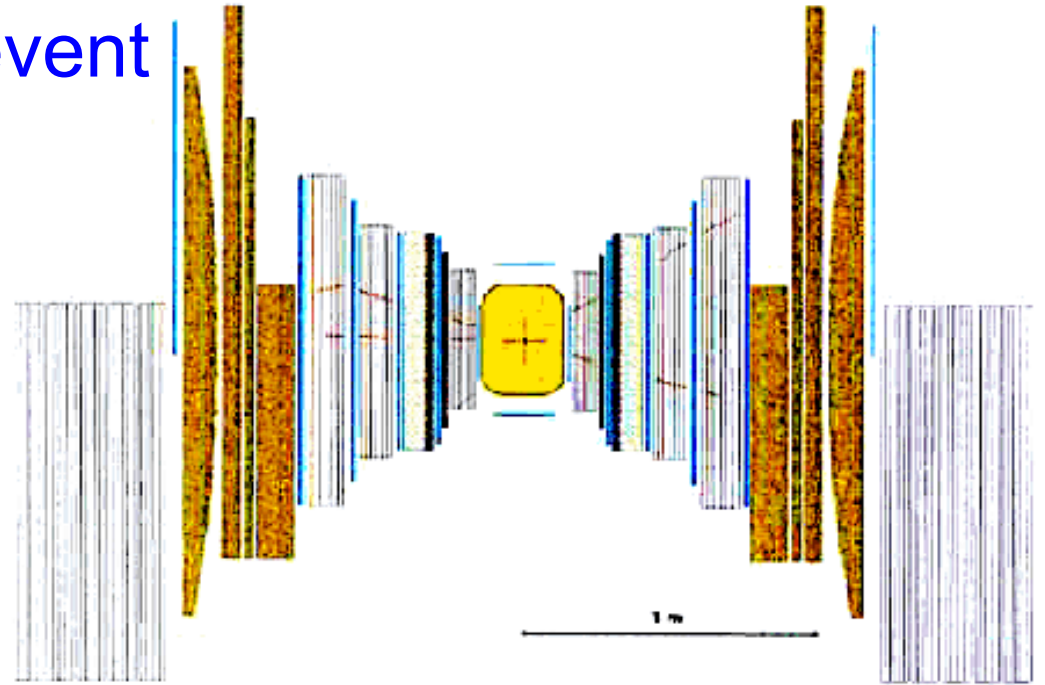
Here no surprise



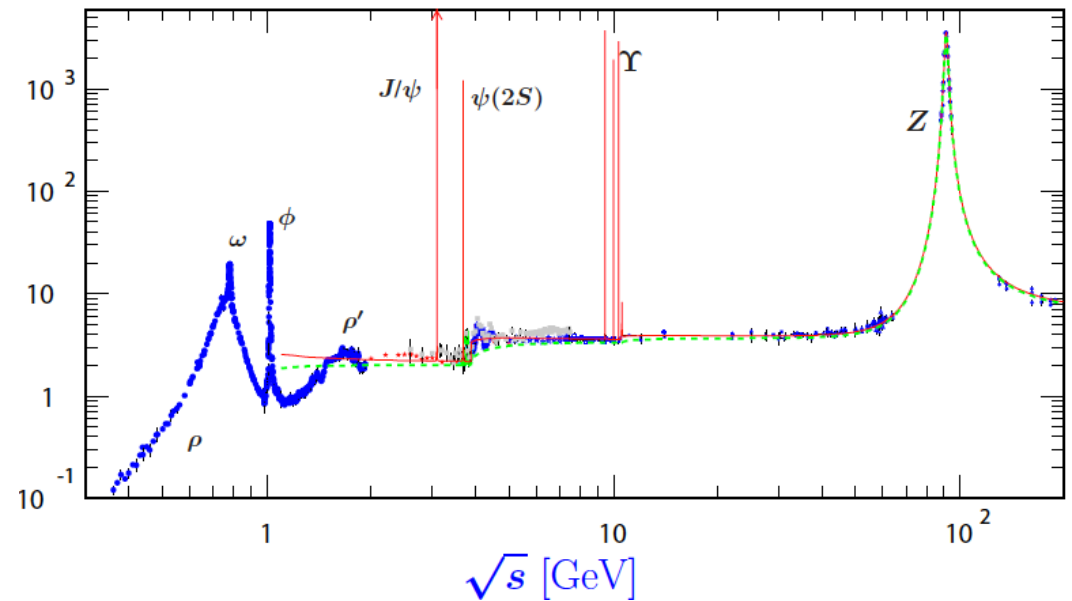
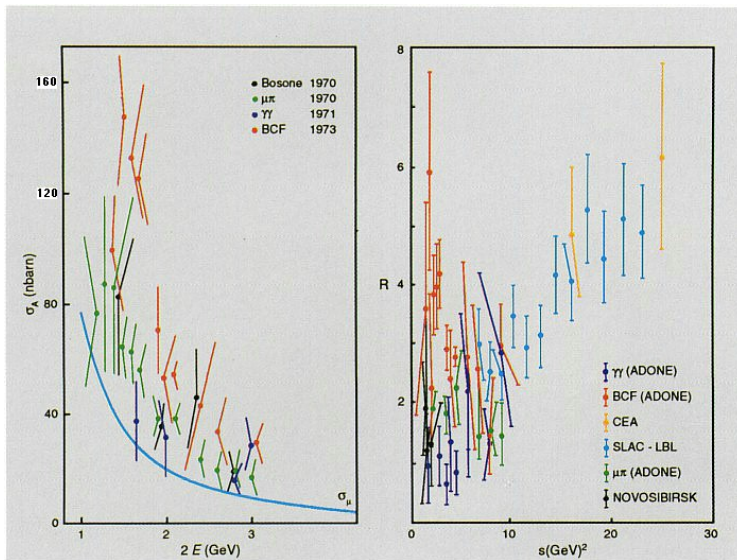
$$\sigma \rightarrow \frac{\pi\alpha^2}{12E^2} \left[\sum_{\text{spin } 0} (Q_i)^2 + 4 \sum_{\text{spin } \frac{1}{2}} (Q_i)^2 \right]$$

$$\sigma \rightarrow 2\sigma_{\mu\mu}$$

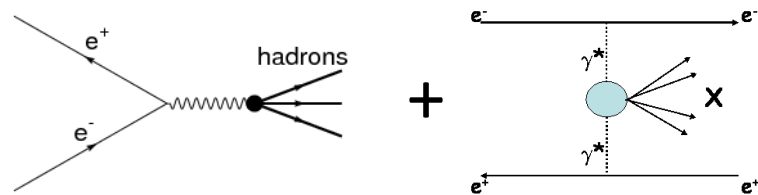
A four charged-particle event



How all this initiated

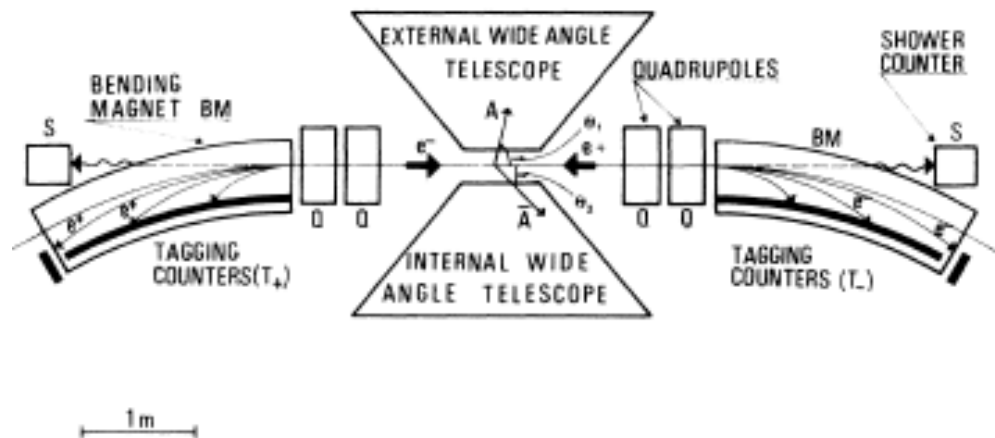


But there are still doubts on the interpretation



The prejudice: Vector Meson Dominance
One or two photons?

The second invention: the $\gamma\gamma$ tagger



At Adone energy surely one-photon exchange wins. Multi-hadron production is firmly established.

VOLUME 32, NUMBER 7

PHYSICAL REVIEW LETTERS

18 FEBRUARY 1974

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

G. Barbiellini, S. Orito, T. Tsuru, and R. Visentin

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)

LETTERE AL NUOVO CIMENTO

VOL. 10, N. 10

6 Luglio 1974

Multihadron Production Through the Photon-Photon Interaction.

L. PAOLUZI

Istituto di Fisica dell'Università - Roma

Istituto Nazionale di Fisica Nucleare - Sezione di Roma

F. CERADINI, M. L. FERRER and R. SANTONICO

Istituto di Fisica dell'Università - Roma

G. BARBIELLINI, S. ORITO and T. TSURU

Laboratori Nazionali di Frascati del CNEN - Frascati (Roma)

(ricevuto il 26 Marzo 1974)

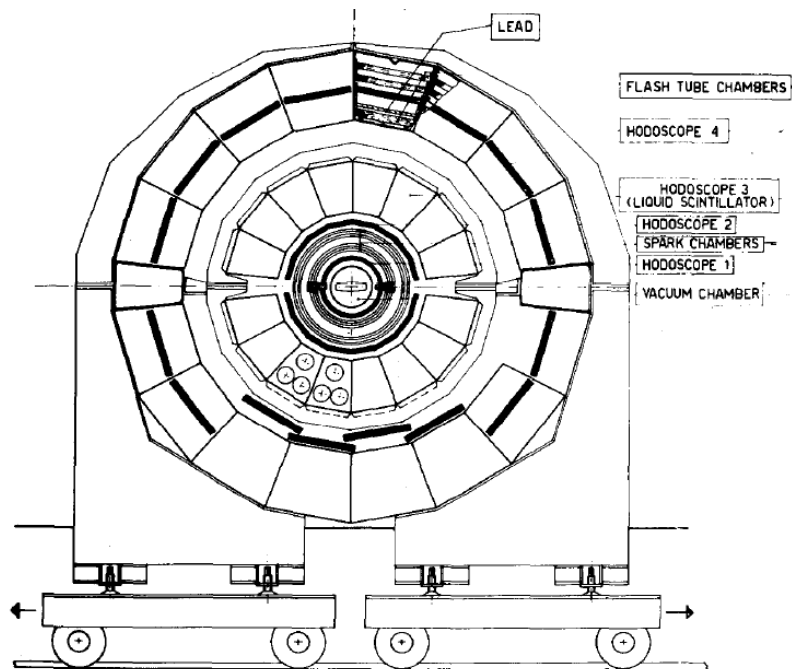
1973: Adone phase 1 ends

phase 2: a compact detector for baryon-antibaryon search

LNF-72/89

13 Ottobre 1972

M. Ambrosio, G. Barbiellini, C. Bemporad, M. Calvetti, M. Castellano, F. Cevenini, F. Costantini, G. Di Giugno, J. W. Humphrey, P. Lariccia, M. Salvatori, E. Sassi, L. Tortora, V. Troya, G. Troise e S. Vitale: UN'ESPERIENZA PER LO STUDIO DI PROCESSI CON PRODUZIONE DI BARIONI AD ADONE.



Observation of the J/ψ resonance

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, M. Locci, C. Mencuccini, G. P. Murtas, G. Penso, G. S. M. Spinetti, M. Spano, B. Stella, and V. Valente

The Gamma-Gamma Group, Laboratori Nazionali di Frascati, Frascati, Italy

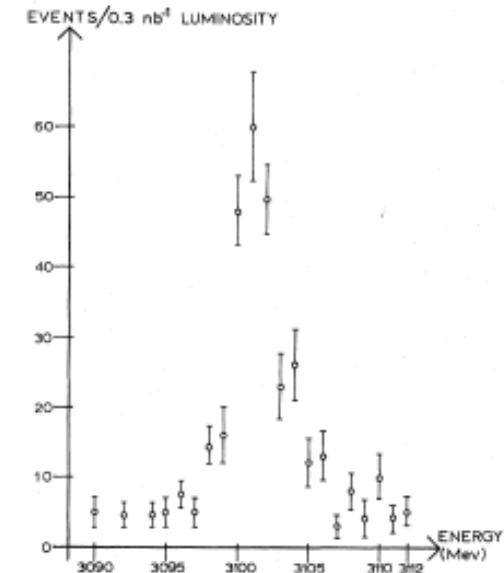
and

B. Bartoli, D. Bisello, B. Esposito, F. Felicetti, P. Monacelli, M. Nigro, L. Paolucci, I. Peruzzi, G. Piano Mortemi, M. Piccolo, F. Ronga, F. Sebastiani, L. Trasatti, and F. Vanoli
The Magnet Experimental Group for ADONE, Laboratori Nazionali di Frascati, Frascati, Italy

and

G. Barbarino, G. Barbiellini, C. Bemporad, R. Biancastelli, F. Cevenini, M. Calvetti, 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)



Guido enjoys the flavour of CERN

Volume 39B, number 5

PHYSICS LETTERS

29 May 1972

SMALL-ANGLE PROTON-PROTON ELASTIC SCATTERING AT VERY HIGH ENERGIES ($460 \text{ GeV}^2 < s < 2900 \text{ GeV}^2$)

G. BARBIELLINI, M. BOZZO, P. DARRIULAT, G. DIAMBRINI PALAZZI,
G. De ZORZI, A. FAINBERG, M. I. FERRERO, M. HOLDER,
A. McFARLAND, G. MADERNI, S. ORITO, J. PILCHER, C. RUBBIA,
A. SANTRONI, G. SETTE, A. STAUDE, P. STROLIN and K. TITTEL

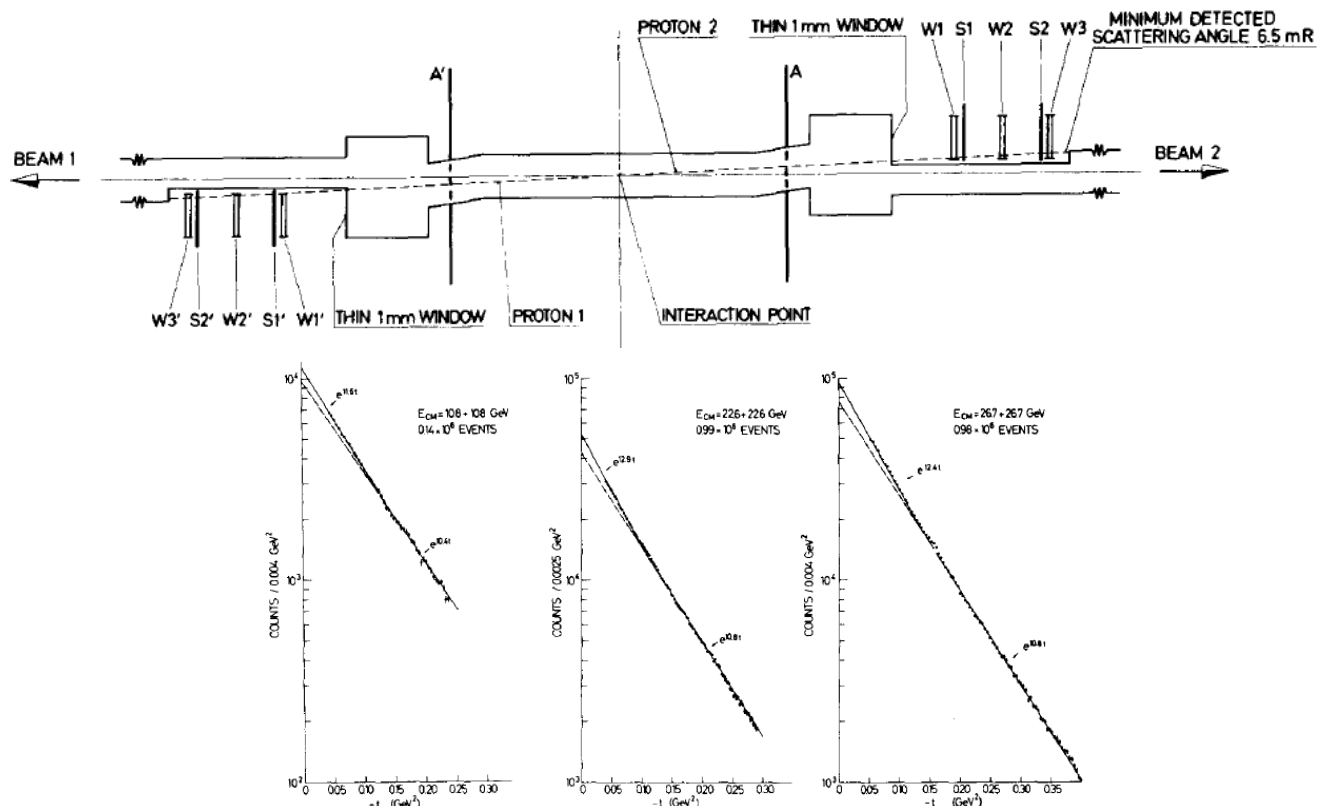


Fig. 2. $|t|$ distributions for centre-of-mass energies: (a) 21.5, (b) 30.8, (c) 44.9, and (d) 53.0 GeV. The two data sets (b) have been taken with the telescopes at different distances from the collision region.

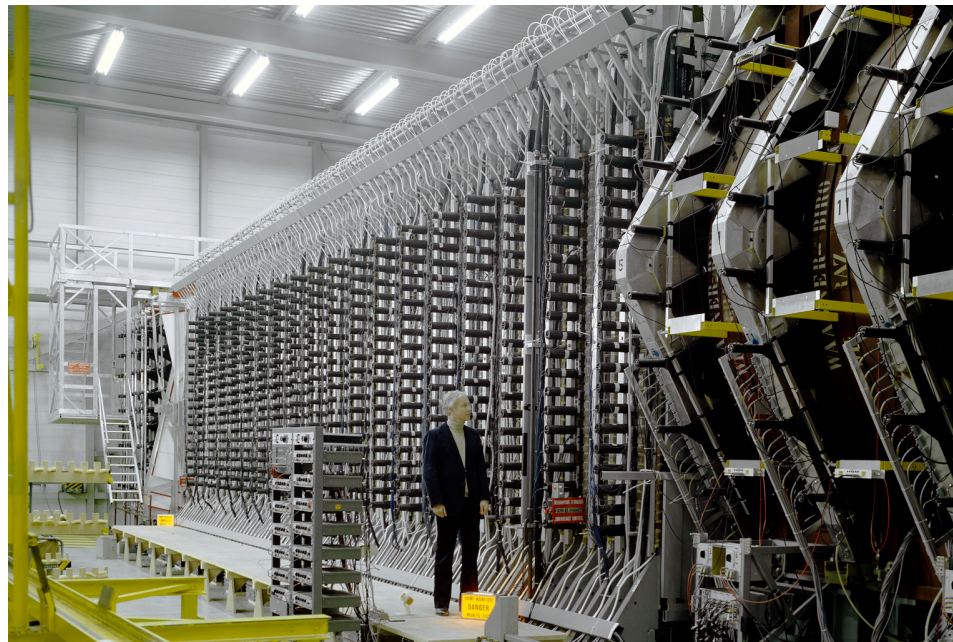
First ideas of a neutrino experiment with a low-density target-calorimeter

LNF-74/4(R)

29 Gennaio 1974

G. Barbàrino, G. Barbiellini, B. Barbini, M. Castellano, F. Cevenini, C. Guaraldo, S. Patricelli, M. Placidi, F. Picozza, E. Sassi, R. Scrimaglio, L. Tortora, U. Troya and S. Vitale: AN EXPERIMENT ON NEUTRINO-LEPTON SCATTERING
(Frascati - Napoli Collaboration). -

Later on ...



80's: the decade of electro-weak

RIVISTA DEL NUOVO CIMENTO

VOL. 9, N. 2

1986

Experimental Status of Weak Interactions.

G. BARBIELLINI

CERN - Geneva, Switzerland

Istituto Nazionale di Fisica Nucleare - Laboratori Nazionali di Frascati, Italia

C. SANTONI

CERN - Geneva, Switzerland,

Istituto Nazionale di Fisica Nucleare - Sezione Sanità

Istituto Superiore di Sanità - Roma, Italia

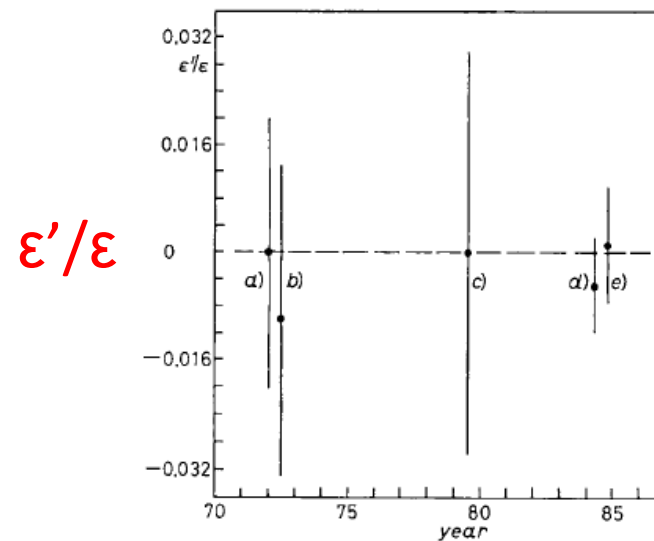


Fig. 30. — Experimental determination of ϵ'/ϵ . The results shown are from a) ref. [67], b) ref. [68], c) ref. [69], d) ref. [65] and e) ref. [66].

90's: the decade of ϵ'/ϵ

The ϕ factory: physics motivations and feasibility problems

G. Barbiellini, M. Bassetti, D. Cocolicchio, Gian Luigi Fogli,
C. Santoni, G. Vignola

Particle World 1, no.5, 138-147 (1990)

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN-EP/89-88

17 July 1989

A MEASUREMENT OF ϵ'/ϵ IN A ϕ FACTORY

G. Barbiellini ¹⁾ and C. Santoni ²⁾

This paper reports the results of a study of the feasibility of a measurement of the CP violation parameters in an $e^+e^- \phi$ factory.

EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

CERN-PPE/90-124

7 september 1990

A STUDY OF DETECTOR PARAMETERS FOR A ϕ FACTORY EXPERIMENT

G. Barbiellini

CERN, Geneva, Switzerland and

Dipartimento di Fisica, Università di Trieste and INFN Sezione di Trieste, Trieste, Italy.

C. Santoni

CERN, Geneva, Switzerland and

Physics Department, University of Basle, Basle, Switzerland.

This paper reports first results of a study performed to define the parameters of a detector adequate for the study of CP violation effects at an $e^+e^- \phi$ factory.



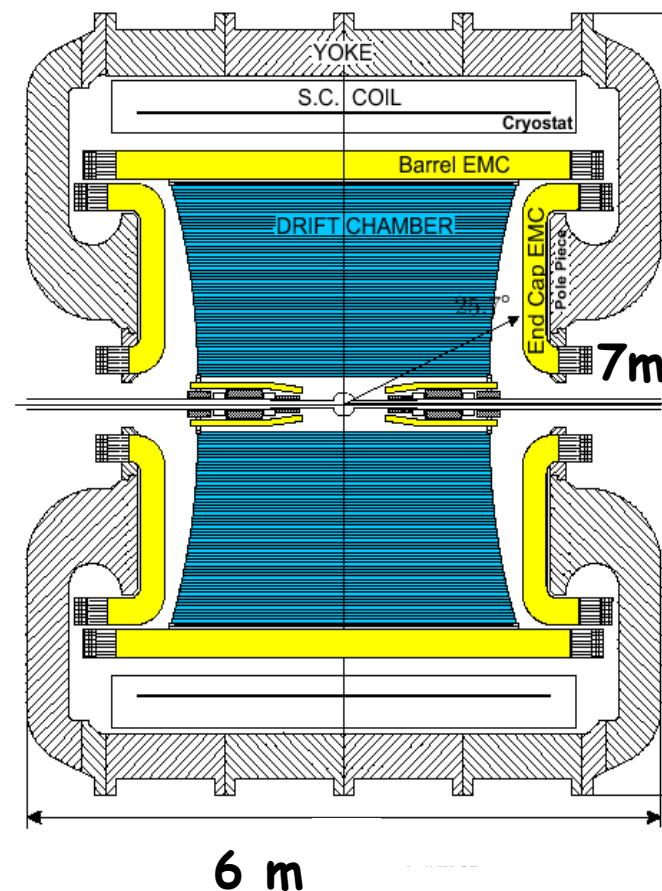
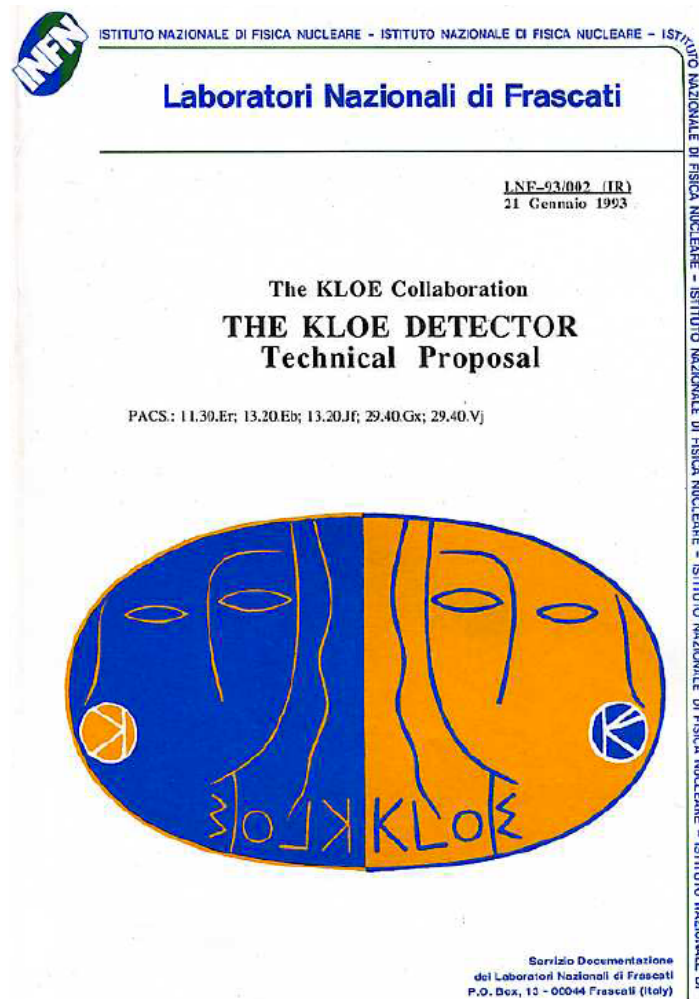
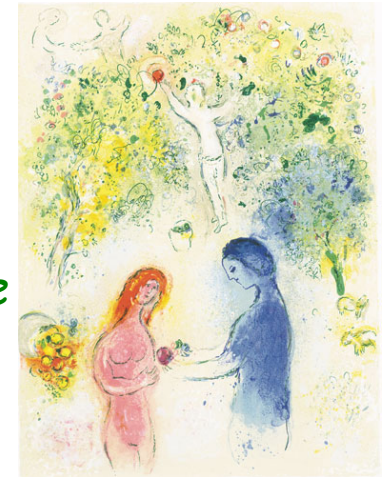
From Adone to DAΦNE

Many ϕ factories were proposed (at UCLA, Novosibirsk, KEK, Jefferson Lab, ...) only one was built

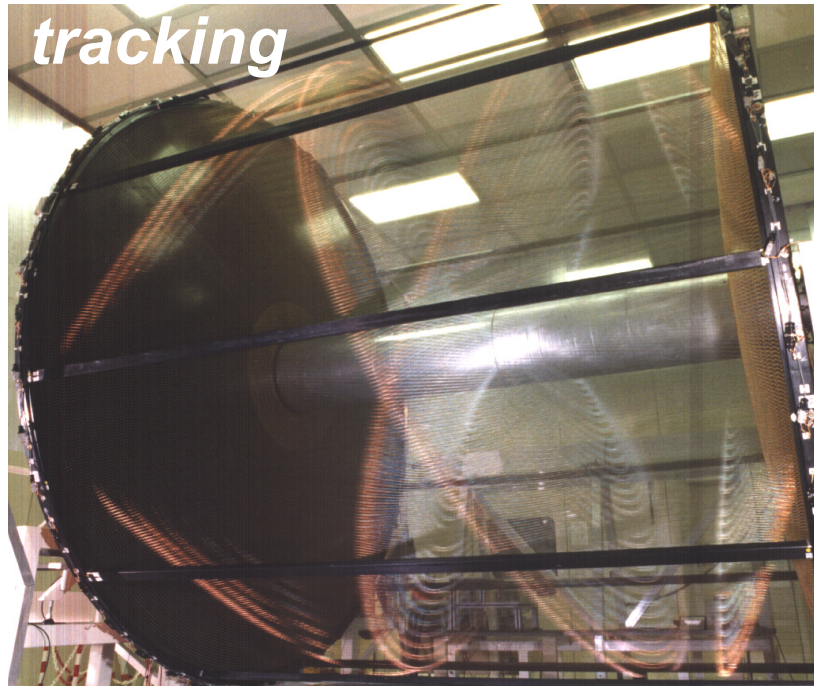


The KLOE experiment at DAΦNE

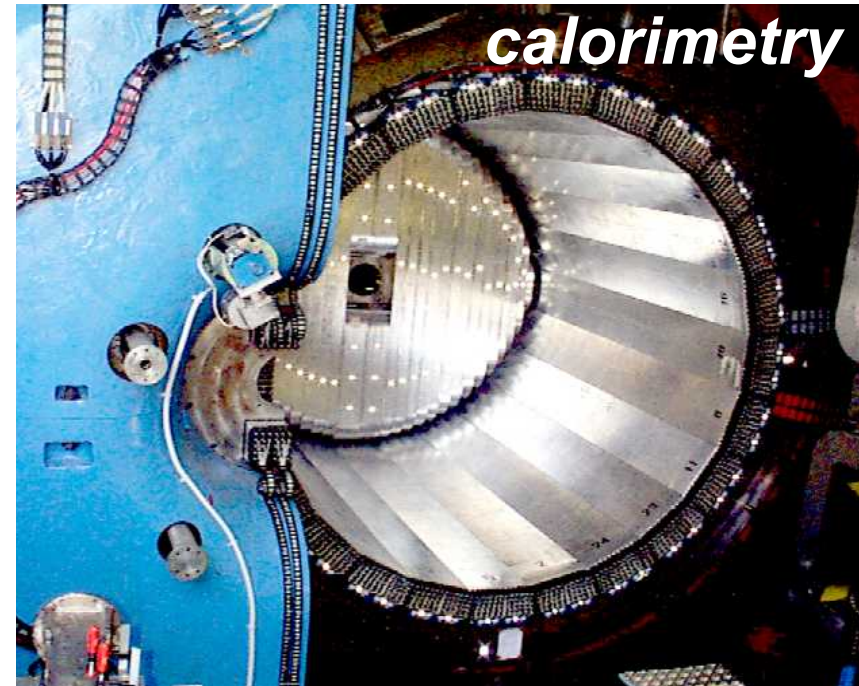
*Daphnis and Chloe
by Marc Chagall*



The KLOE detectors



A large-volume tracking detector
filled with Helium

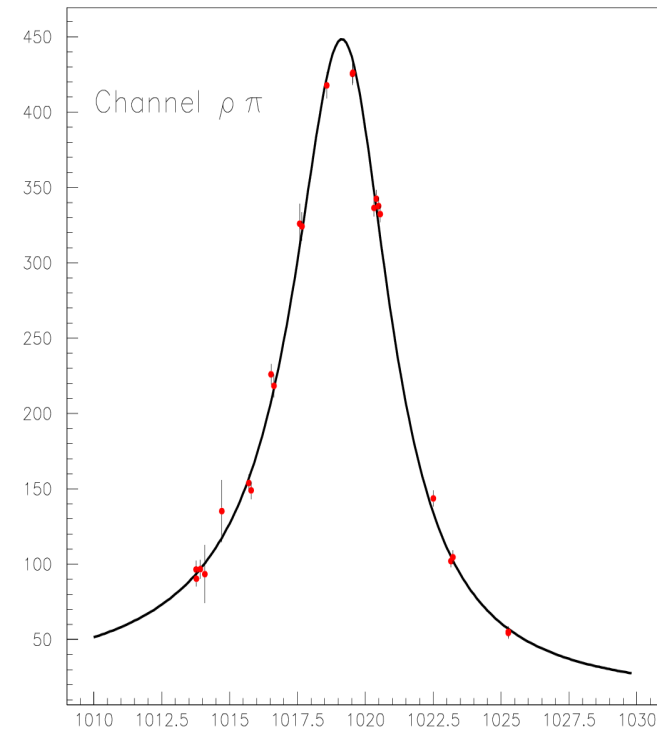
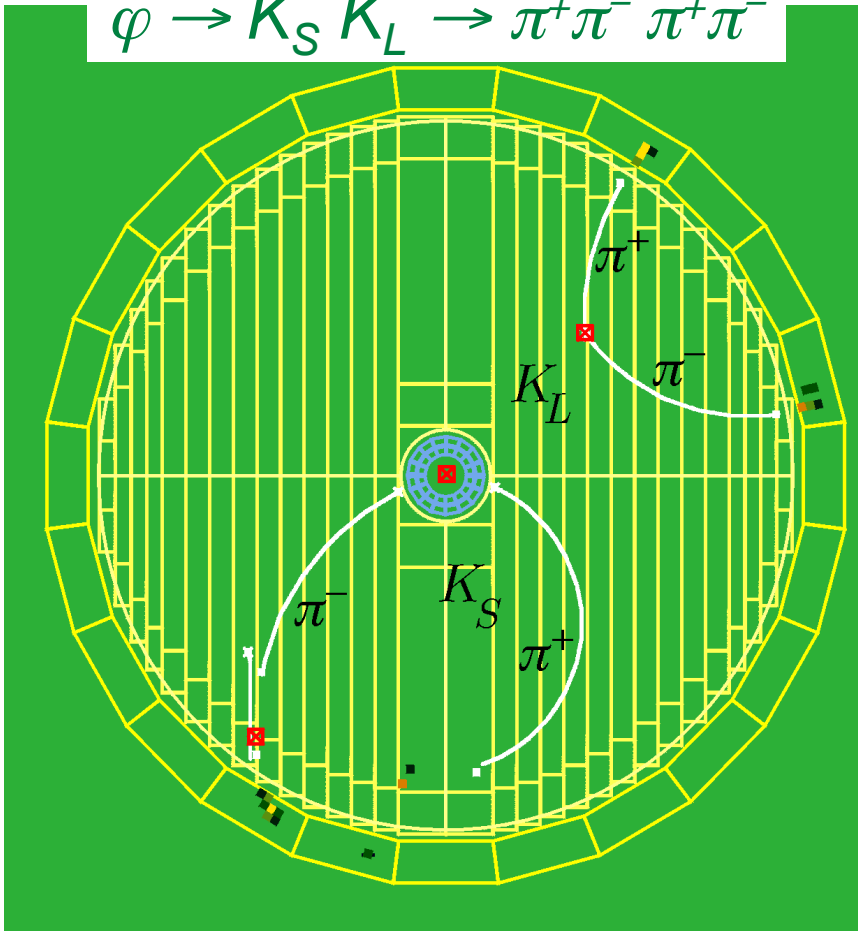


A fine-grained scintillating fibers
tracking calorimeter

1999: commissioning of the experiment

CERN photo of the month

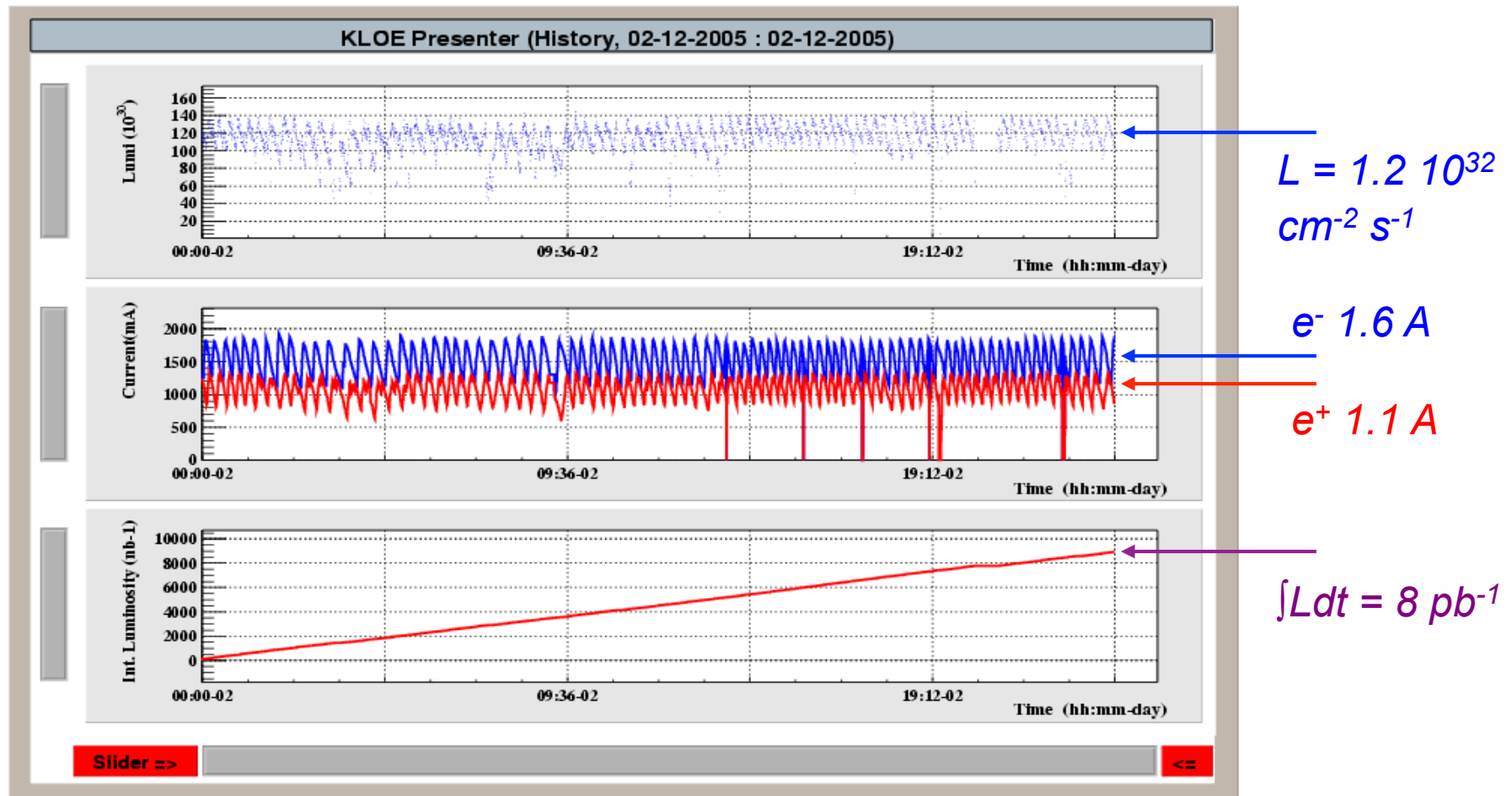
$$\varphi \rightarrow K_S K_L \rightarrow \pi^+ \pi^- \pi^+ \pi^-$$



The ϕ resonance line shape

How did work, a reward to Guido's studies

DAΦNE 24h performance in topping-up mode, december 05



Some best measurements, from the Review of Particle Properties

K^0 MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
497.611 ± 0.013 OUR FIT	Error includes scale factor of 1.2.			
497.611 ± 0.013 OUR AVERAGE	Error includes scale factor of 1.2.			
497.607 ± 0.007 ± 0.015	261k	¹ TOMARADZE 14		$\psi(2S) \rightarrow K_S^0 X$
497.583 ± 0.005 ± 0.020	35k	AMBROSINO 07B	KLOE	$e^+ e^- \rightarrow K_L^0 K_S^0$
497.625 ± 0.001 ± 0.031	655k	LAI 02	NA48	K_L^0 beam
497.661 ± 0.033	3713	BARKOV 87B	CMD	$e^+ e^- \rightarrow K_L^0 K_S^0$
497.742 ± 0.085	780	BARKOV 85B	CMD	$e^+ e^- \rightarrow K_L^0 K_S^0$

CP-VIOLATION PARAMETERS

Re(ϵ)

VALUE (units 10^{-3})	DOCUMENT ID	TECN
1.596 ± 0.013	³ AMBROSINO 06H	KLOE

• • • We do not use the following data for averages, fits, limits, etc. • • •

η MASS

VALUE (MeV)	EVTS	DOCUMENT ID	TECN	COMMENT
547.862 ± 0.017 OUR AVERAGE				
547.865 ± 0.031 ± 0.062		NIKOLAEV 14	CRYB	$\gamma p \rightarrow p \eta$
547.873 ± 0.005 ± 0.027	1M	GOSLAWSKI 12	SPEC	$d p \rightarrow {}^3\text{He} \eta$
547.874 ± 0.007 ± 0.029		AMBROSINO 07B	KLOE	$e^+ e^- \rightarrow \phi \rightarrow \eta \gamma$
547.785 ± 0.017 ± 0.057	16k	MILLER 07	CLEO	$\psi(2S) \rightarrow J/\psi \eta$
547.843 ± 0.030 ± 0.041	1134	LAI 02	NA48	$\eta \rightarrow 3\pi^0$

η DECAY RATES

$\Gamma(2\gamma)$

VALUE (keV)	EVTS	DOCUMENT ID	TECN	COMMENT
0.515 ± 0.018 OUR FIT				
0.516 ± 0.018 OUR AVERAGE				
0.520 ± 0.020 ± 0.013		BABUSCI 13A	KLOE	$e^+ e^- \rightarrow e^+ e^- \eta$
0.51 ± 0.12 ± 0.05	36	BARU 90	MD1	$e^+ e^- \rightarrow e^+ e^- \eta$
0.490 ± 0.010 ± 0.048	2287	ROE 90	ASP	$e^+ e^- \rightarrow e^+ e^- \eta$

Γ_2

K_L^0 MEAN LIFE

VALUE (10^{-8} s)	EVTS	DOCUMENT ID	TECN	COMMENT
5.116 ± 0.021 OUR FIT	Error includes scale factor of 1.1.			
5.099 ± 0.021 OUR AVERAGE				
5.072 ± 0.011 ± 0.035	13M	¹ AMBROSINO 06	KLOE	$\sum_i B_i = 1$
5.092 ± 0.017 ± 0.025	15M	AMBROSINO 05C	KLOE	
5.154 ± 0.044	0.4M	VOSBURGH 72	CNTR	

$K^\pm$ MEAN LIFE

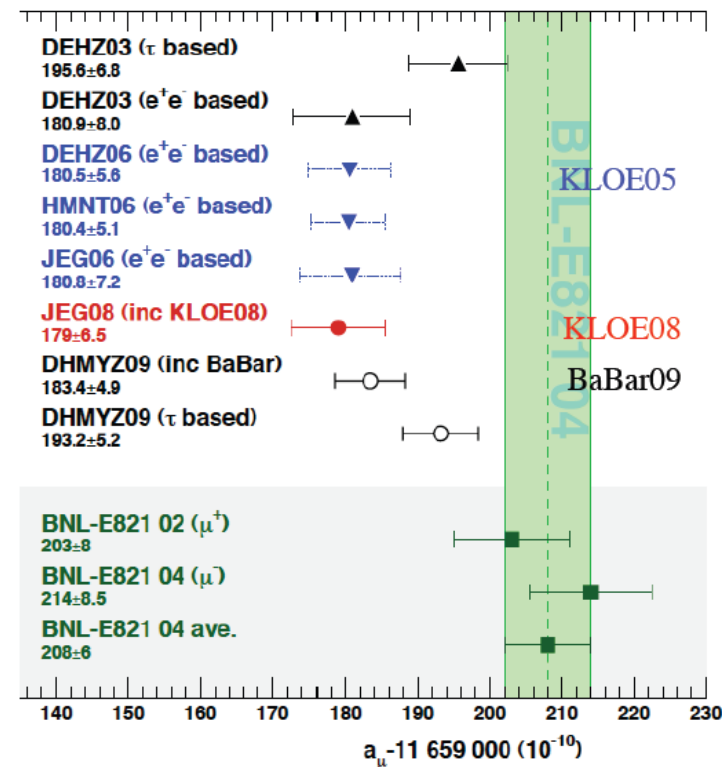
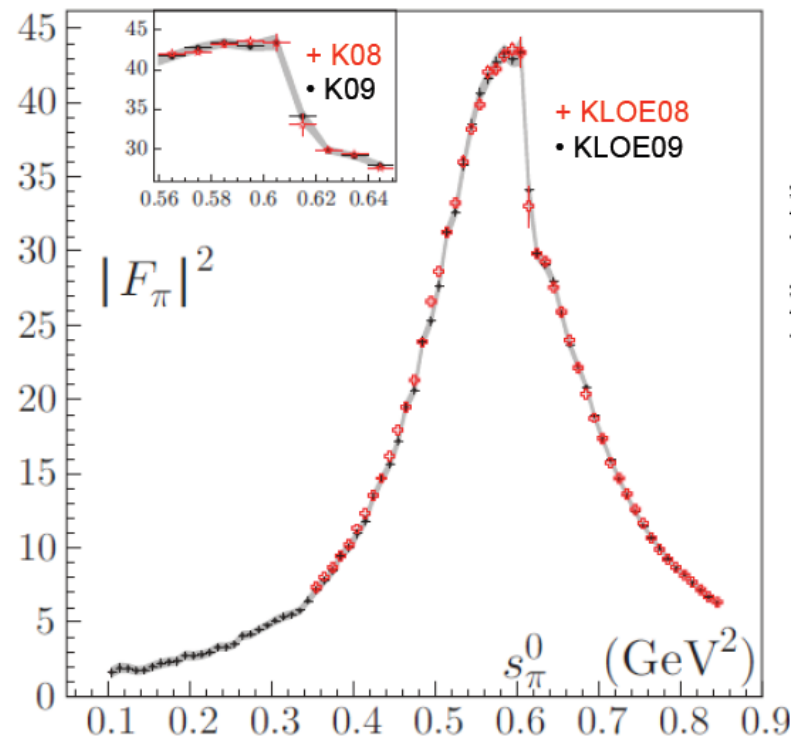
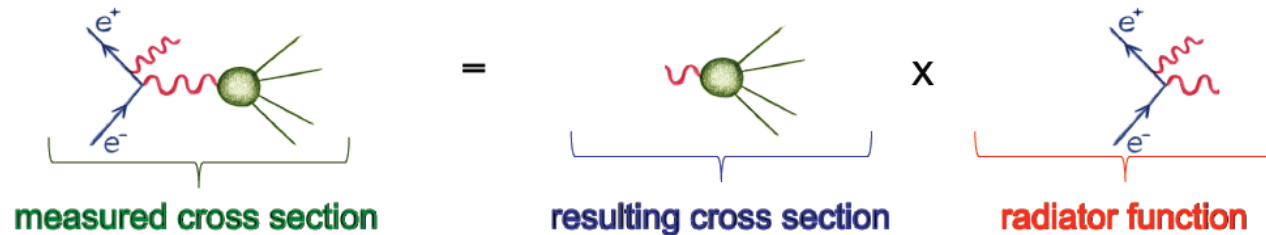
VALUE (10^{-8} s)	EVTS	DOCUMENT ID	TECN	CHG	COMMENT
1.2380 ± 0.0020 OUR FIT	Error includes scale factor of 1.8.				
1.2379 ± 0.0021 OUR AVERAGE	Error includes scale factor of 1.9. See the ideogram below.				
1.2347 ± 0.0030	15M	⁵ AMBROSINO 08	KLOE	±	$\phi \rightarrow K^+ K^-$
1.2451 ± 0.0030	250k	KOPTEV 95	CNTR		K at rest, U target
1.2368 ± 0.0041	150k	KOPTEV 95	CNTR		K at rest, Cu target
1.2380 ± 0.0016	3M	OTT 71	CNTR	+	K at rest
1.2272 ± 0.0036		LOBKOWICZ 69	CNTR	+	K in flight
1.2443 ± 0.0038		FITCH 65B	CNTR	+	K at rest

The calculation of the ratio of the kaon and pion decay constants enables one to extract $|V_{us}/V_{ud}|$ from $K \rightarrow \mu\nu(\gamma)$ and $\pi \rightarrow \mu\nu(\gamma)$, where (γ) indicates that radiative decays are included [17]. The KLOE measurement of the $K^+ \rightarrow \mu^+\nu(\gamma)$ branching ratio [18], combined with the lattice QCD calculation, $f_K/f_\pi = 1.1947 \pm 0.0045$ [19], leads to $|V_{us}| = 0.2253 \pm 0.0010$, where the accuracy is limited by the knowledge of the ratio of the decay constants. The average of these two determinations is quoted by Ref. 9 as

$$|V_{us}| = 0.2253 \pm 0.0008. \quad (12.8)$$

$e^+e^- \rightarrow \text{hadrons}$ and contribution to the muon anomaly

$$\frac{d\sigma(e^+e^- \rightarrow \text{hadrons} + \gamma)}{dM_{\text{hadr}}^2} = \frac{\sigma(e^+e^- \rightarrow \text{hadrons}, M_{\text{hadr}}^2)}{s} H(s, M_{\text{hadr}}^2)$$



Guido agile on the waves



Award of the town of Trieste for his contribution to high-energy gamma astronomy - September 28, 2015

Guido agile on the waves



Tanti auguri !