Sociology of the ARGUS Collaboration

R. Armenteros et al. (ed.): Physics from Friends - Papers dedicated to C. Peyrou

D.R.O. Morrison: The Sociology of International Collaborations

- "Spokesman is an outstanding physicist and leader who is the dominant personality in the collaboration"
- "It is important to have at least a second major personality in the collaboration"
- "A collaboration in which there are several major personalities and which is completely democratic **does have a problem**"

ARGUS spokesmen

Did ARGUS have a problem ?

1979-1989

1990-2000

A fructibus eorum cognoscetis eos (Matth. 7, 16)

K. Berkelman 1992:

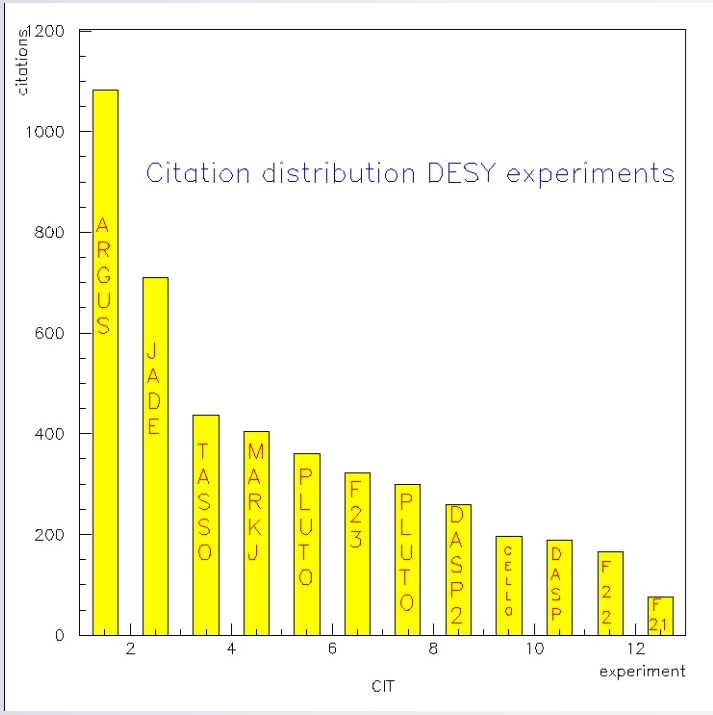
In particular, the ARGUS collaboration, about 80 physicists from DESY, several German universities, and others in Canada, Russia, and elsewhere, has been one of the most productive collaborations in the history of experimental high energy physics. ARGUS has been the source of most of the publications of the DESY laboratory since the PETRA machine was shut down about six years ago, over 100 papers on the physics of B mesons, charmed particles, τ leptons, and $\gamma\gamma$ collisions.

Particle Physics
Experimental Papers

Top 20 citation list

SPIRES, 20.10.2007

	Experiment	Topics	Publication	Citat.
1.	Sup.Kamiokande	Evid. for ν Oscillations	PRL,81(1998)1562	2921
2.	Aubert *ea* (BNL)	Observation of J	PRL,33(1974)1404	1548
3.	SNO	Evid. for ν Oscillations	PRL,89(2002)011301	1463
4.	MARK I (SLAC)	Observation of ψ	PRL,33(1974)1406	1453
5.	CDF (FNAL)	Observ. of Top Quark	PRL,74(1995)2626	1408
6.	SNO	Meas. of Rate ν_e+D	PRL,87(2001)071301	1404
7.	KamLAND	Evid.for Anti-ν Disap.	PRL,90(2003)021802	1397
8.	Cristenson (BNL)	Obs. of CP Violation	PRL,13(1964)138	1380
9.	EMC (CERN)	Spin Assymetry μ DIS	PL,B206(1988)364	1354
10.	D0 (FNAL)	Observ. of Top Quark	PRL,74(1995)2632	1348
11.	HOMESTAKE	Meas. of Solar ν_e Flux	APJ,496(1998)505	1304
12.	CHOOZ	Limits on ν Oscillation	PL,B466(1999)415	1259
13.	UA1 (CERN)	Observation of W	PL,B122(1983)103	1209
14.	EMC (CERN)	Spin Struct. of Proton	NP,B328(1989)1	1176
15.	UA1 (CERN)	Observation of Z0	PL,B126(1983)398	1129
16.	Herb *ea* (FNAL)	Observation of Y	PRL,39(1977)252	1109
17.	ARGUS (DESY)	Obs. of $B^0\bar{B}^0$ Mixing	PL,B192(1987)245	1089
18.	UA2 (CERN)	Evidence for Z0	PL,B129(1983)130	1049
19.	UA2 (CERN)	Observation of W	PL,B122(1983)476	1030
20.	Kamiokande	Atmosph. ν_μ/ν_e Ratio	PL,B335(1994)237	975



Why was ARGUS so successful ?

Conception, Birth and Growth of ARGUS Collaboration

Spring/Summer 1977: H. Schopper, W. Schmidt-Parzefall
14.09.1977: WSP and DW
10.-11.10.1977: Meeting on DESY Experiments, Int.Rep.F15/01 (Nov.1977)

Detector Design Study

C. W. Darden
H. Hasemann
A. Kralzig
W. Schmidt-Parzefall
H. Schröder
H.-D. Schulz
F. Selonke
R. Wurth

Why

DORIS = gold mine

Charm Spectroscopy
Heavy Lepton (non sequential?)
Upsilon region

Cornell, SPEAR

What

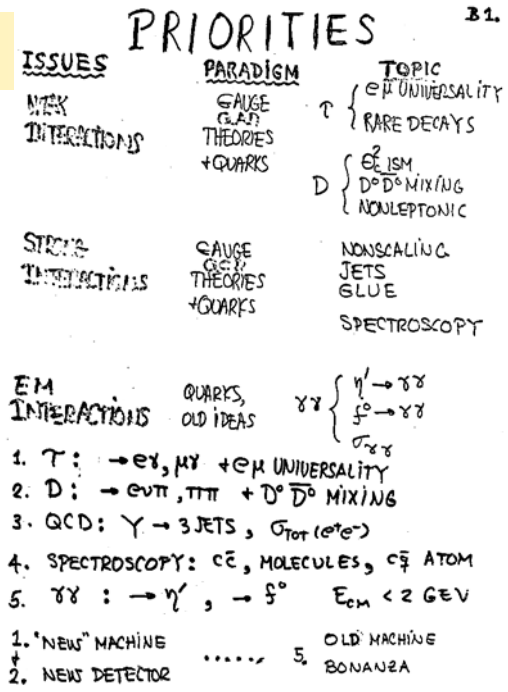
Solid angle
Resolution
Identification

Second Generation ? = Last Generation

Detector Components tentative

Open : COST
Name

T. Walsh



PRIORITIES

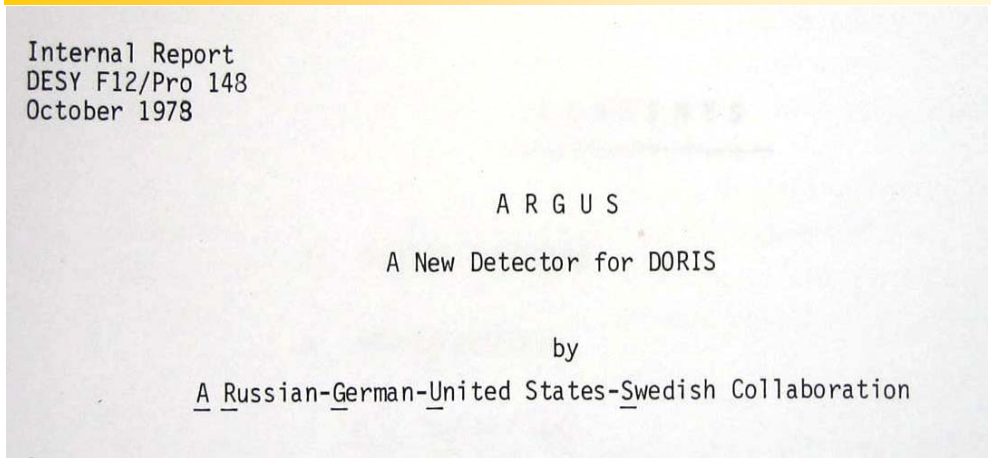
31.

ISSUES	PARADIGM	TOPIC
WEAK INTERACTIONS	GAUGE GUT THEORIES +QUARKS	τ { $e\mu$ UNIVERSALITY; RARE DECAYS
		D { Θ^2 ISM; $D^0\bar{D}^0$ MIXING; NONLEPTONIC
STRONG INTERACTIONS	GAUGE GUT THEORIES +QUARKS	NONSCALING; JETS; GLUE; SPECTROSCOPY
EM INTERACTIONS	QUARKS, OLD IDEAS	$\gamma\gamma$ { $\eta' \to \gamma\gamma$; $f^0 \to \gamma\gamma$; $\sigma_{\gamma\gamma}$

1. τ: $\to e\gamma, \mu\gamma$ + $e\mu$ UNIVERSALITY
2. D: $\to e\nu\pi, \pi\pi$ + $D^0\bar{D}^0$ MIXING
3. QCD: $\Upsilon \to$ 3 JETS, $\sigma_{tot}(e^+e^-)$
4. SPECTROSCOPY: $c\bar{c}$, MOLECULES, $c\bar{q}$ ATOM
5. $\gamma\gamma$: $\to \eta'$, $\to f^0$ $E_{cm} < 2$ GEV

1. "NEW" MACHINE + 2. NEW DETECTOR ..... 5. OLD MACHINE BONANZA

ARGUS proposal



Internal Report
DESY F12/Pro 148
October 1978

A R G U S

A New Detector for DORIS

by

A Russian-German-United States-Swedish Collaboration

DESY(8) – Dortmund (6) – Heidelberg (3) – Lund (2) – ITEP (9) – South Carolina (2)

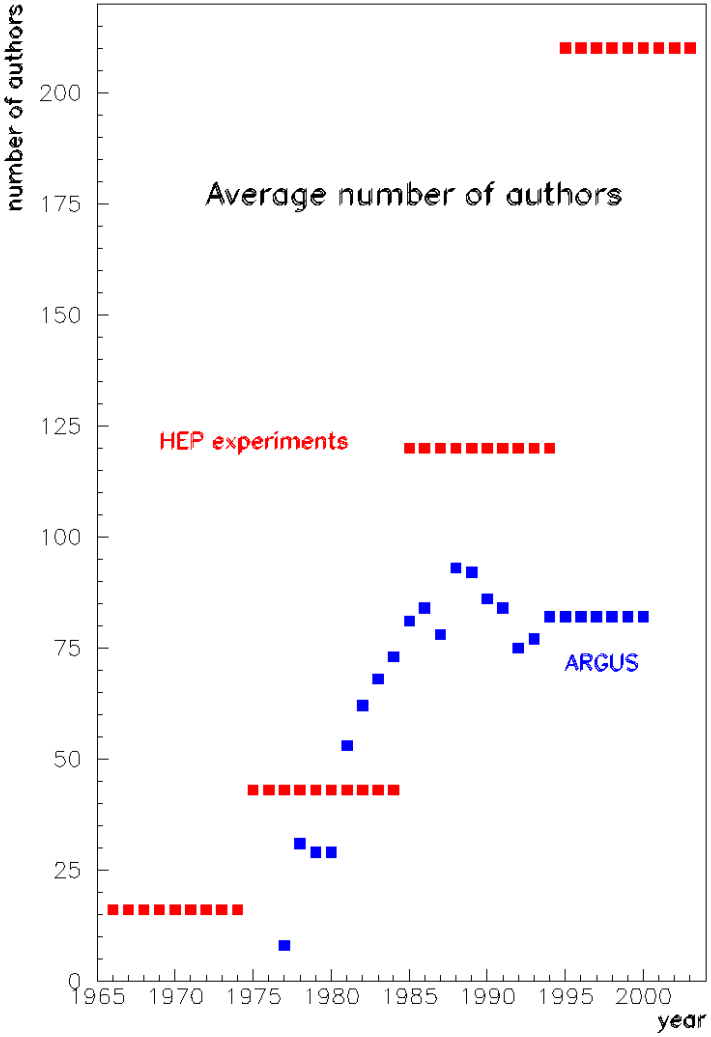
Proposal presented October 1978 by youngsters:

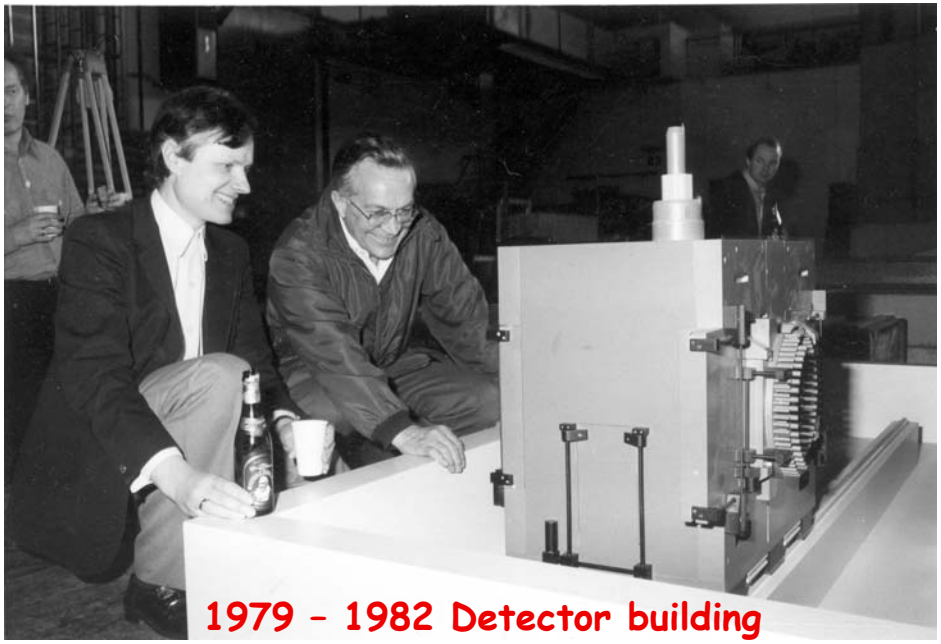
Proposal accepted June 1979 (Birth of ARGUS)

Growth

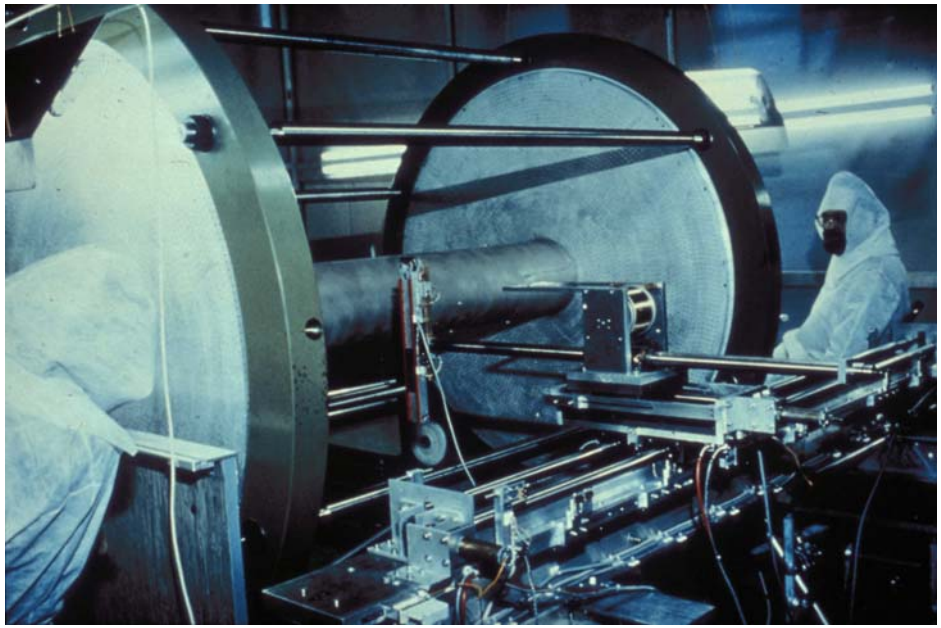
Autumn 1981 IPP Canada and University of Kansas joined

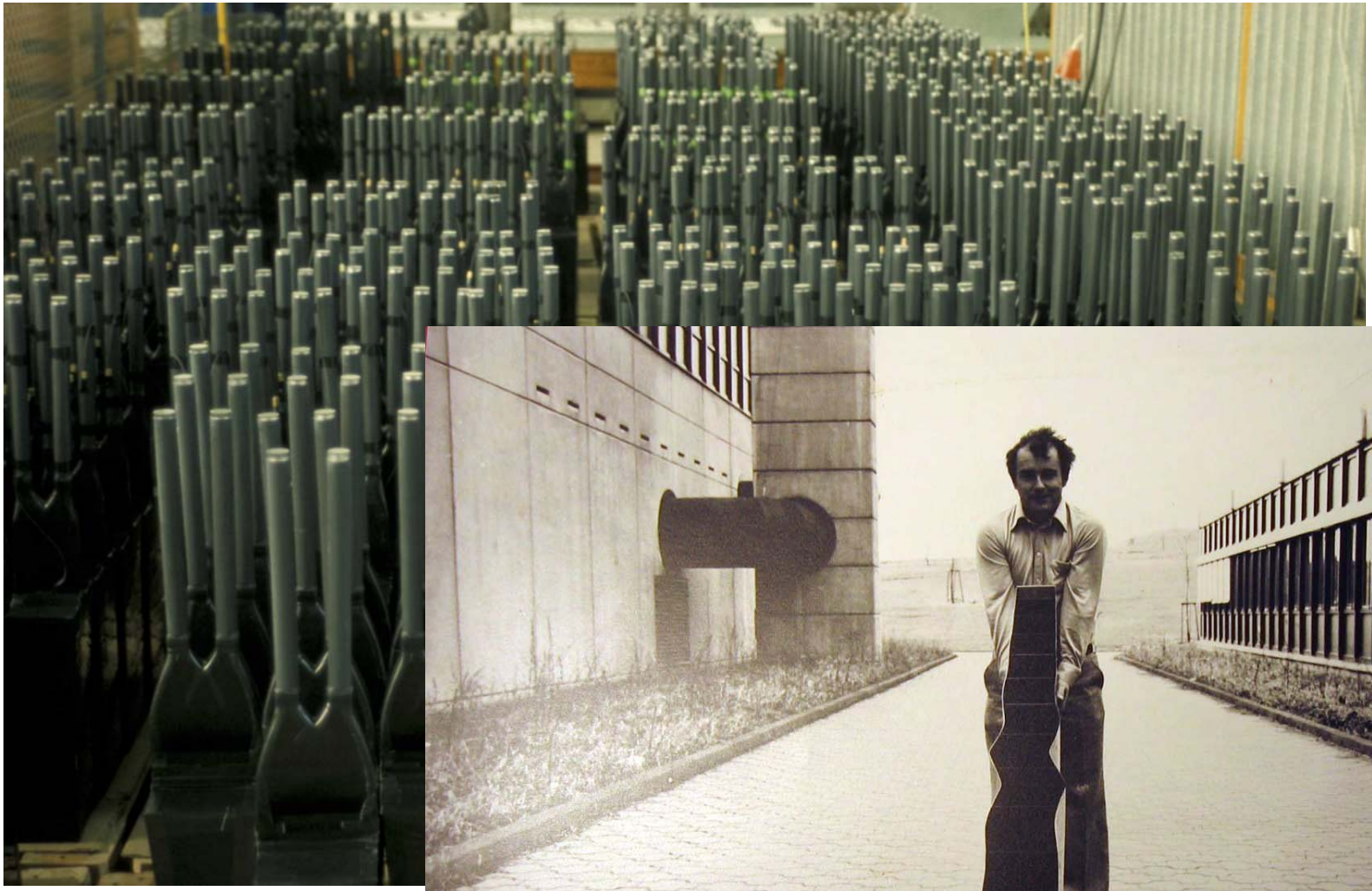
- Sufficient strength /credibility achieved
- Duties for all major detector components and for software covered

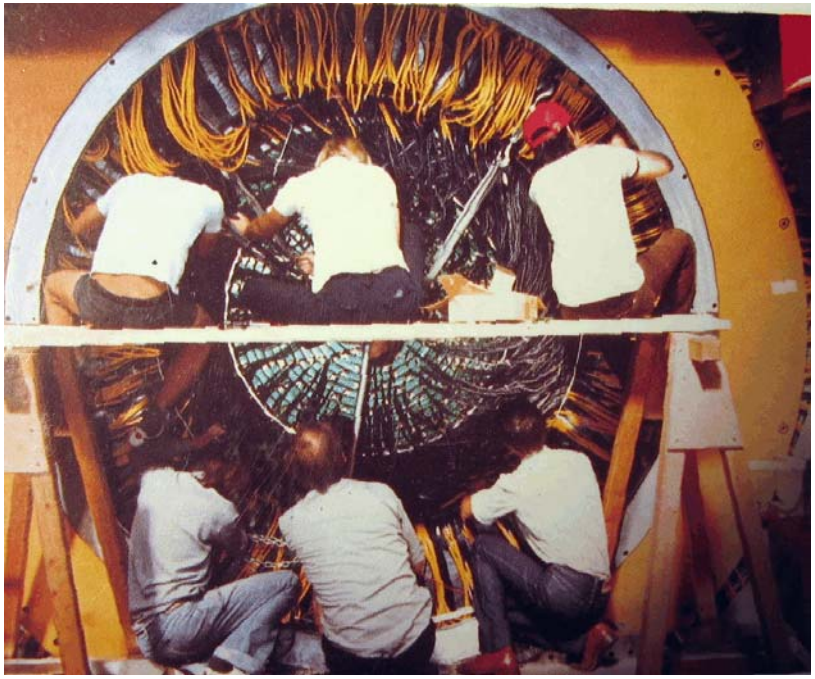




1979 – 1982 Detector building







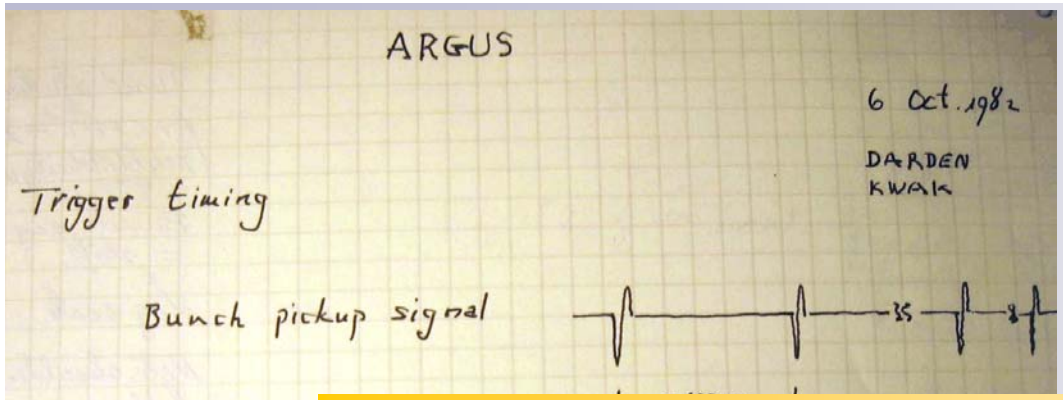
Why was ARGUS so successful ?

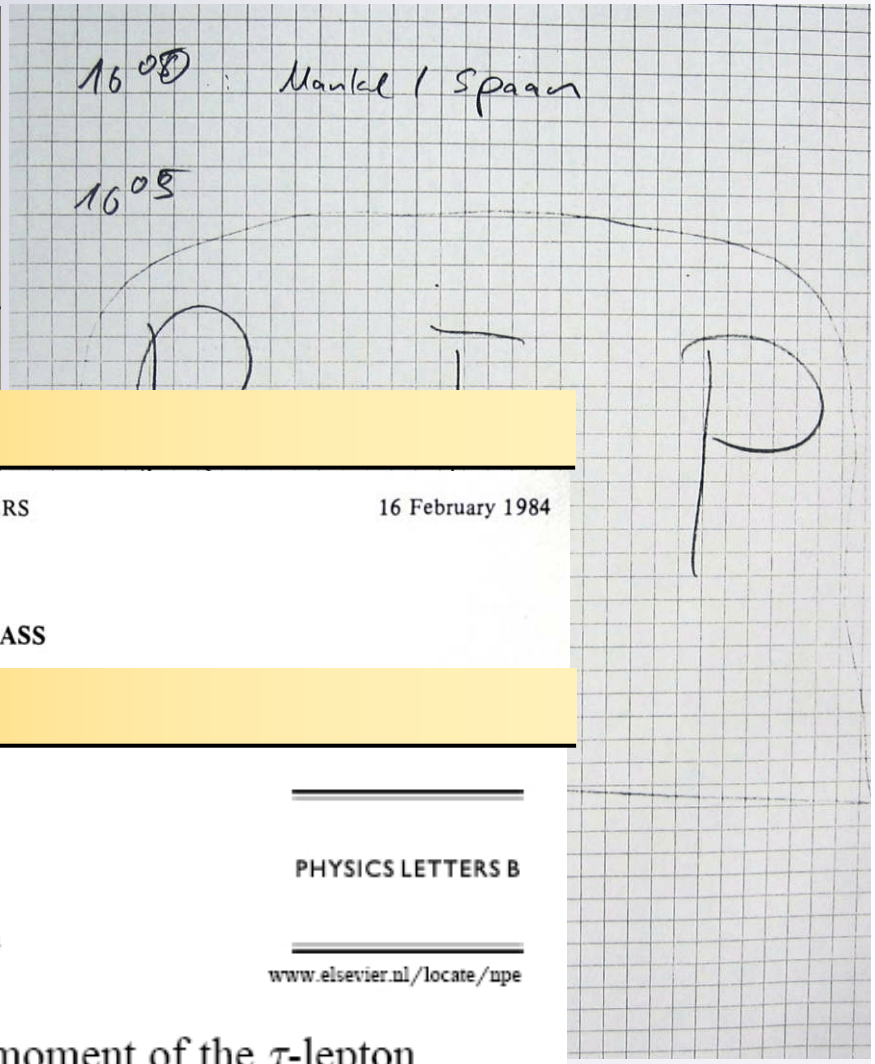
- responsibility to build, operate, calibrate major components in one hand
- 1982-1992 no change of responsibility

- each PhD student got the chance to achieve hardware experience

Collaboration in its Maturity

Running: Oct 6, 1982, 16:00 — Oct 8, 1992, 24:00





Machine
ARGUS
CB

First publication

Volume 135B, number 5,6 PHYSICS LETTERS 16 February 1984

A PRECISION MEASUREMENT OF THE Υ' MESON MASS

Last publication

N·H
ELSEVIER

13 July 2000

PHYSICS LETTERS B

Physics Letters B 485 (2000) 37–44

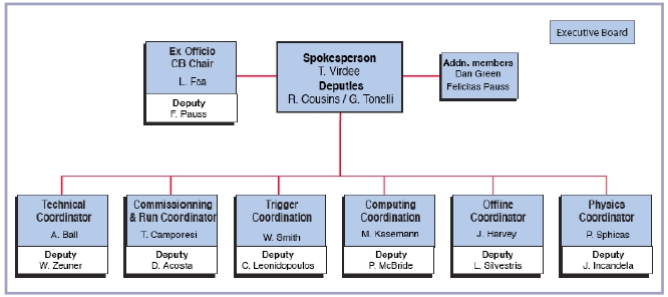
www.elsevier.nl/locate/npe

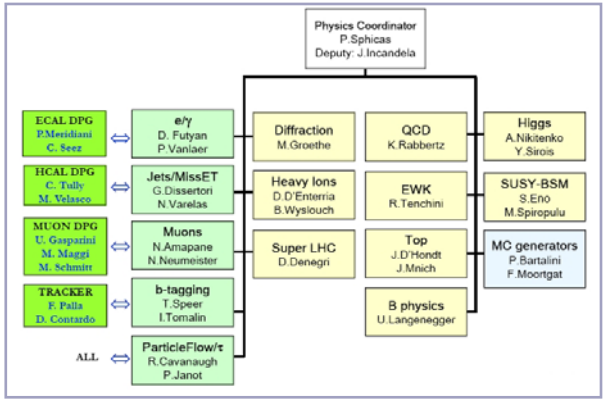
A search for the electric dipole moment of the τ-lepton

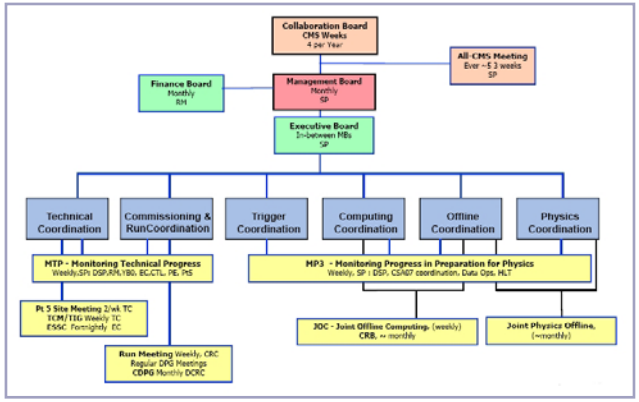
ARGUS Collaboration

a) Organization

Nowadays: CMS







Coordinators + deputies » # ARGUS authors

ARGUS: Selforganization

Zwergenaufstand
Teil I

The uprising of the dwarfs

Kapitza,

4 Man power estimates

We tried to set up a rough estimate how many people are needed for all tasks mentioned above under the assumption that all this has to be done as full time job over 6 months.

$\frac{dE}{dx}$ **calibration** 1 PhD student (plus one "active responsible" post doc / senior in background)

Drifttime-space-relation 1 PhD student (plus one active post doc / senior in background)

SH calibration and tuning of the program 1 diploma student (plus one active PhD student / post doc in the background)

TOF-calibration 1 PhD student

MU-analysis 1 (wo)man

VX-Fit 1 PhD student (plus one very active senior in background)

trackfit/superfit 1 (wo)man

luminosity 1 diploma / PhD student

ıordered
ımmarize

unity to
gs as an

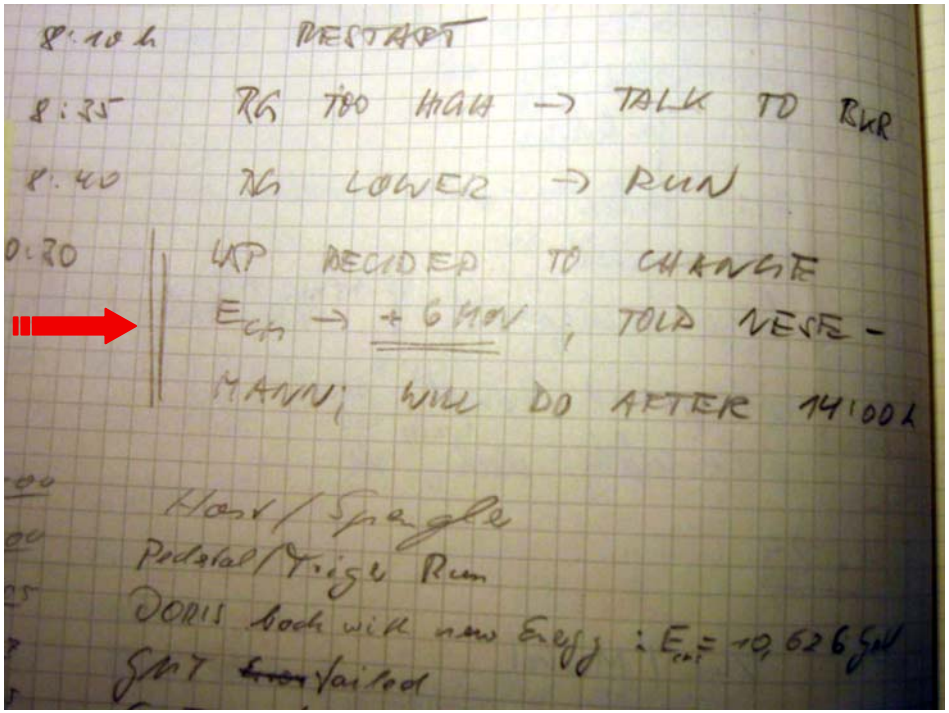
Extremely successful initiative

ARGUS Organization simple

Spokesman

Senior Coffee Club

Decisions clear and problem orientated

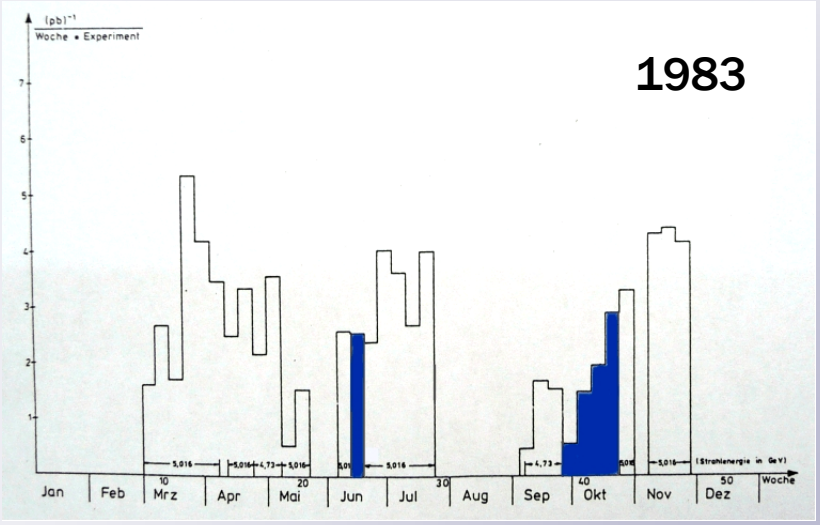


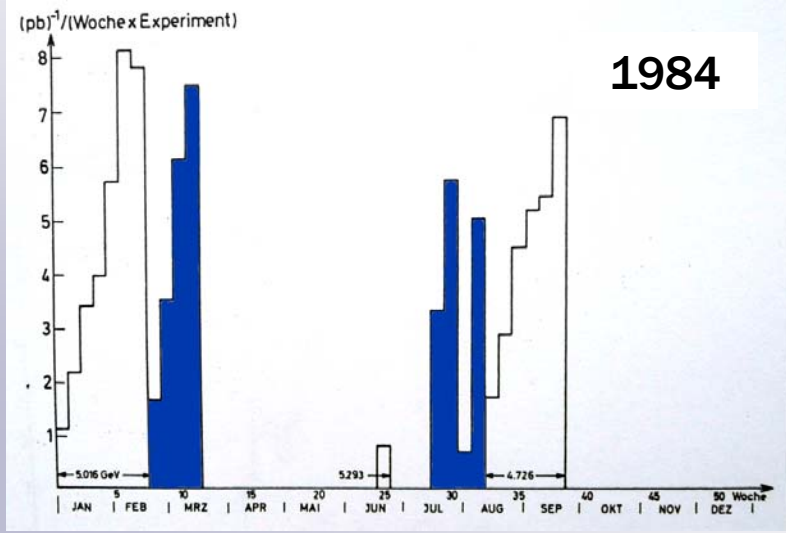
Time for real work

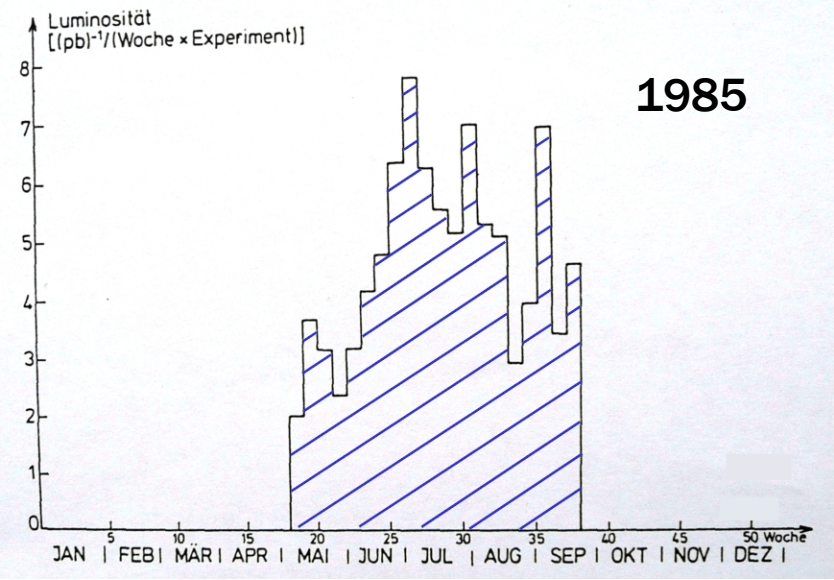
Problem: Missing dominant physicist being a member of the DESY establishment

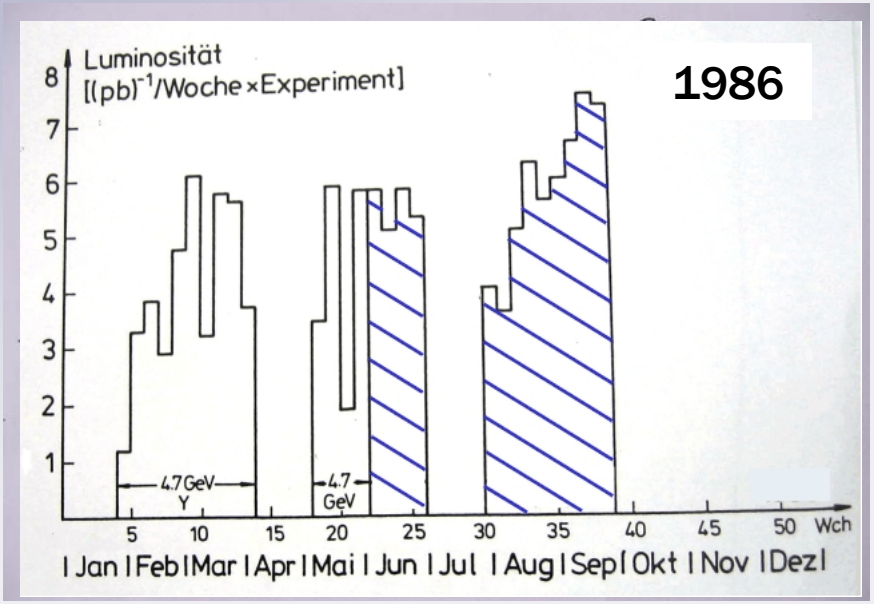
b) Data taking

- Priority to Crystal Ball Physics Program









b) Data taking

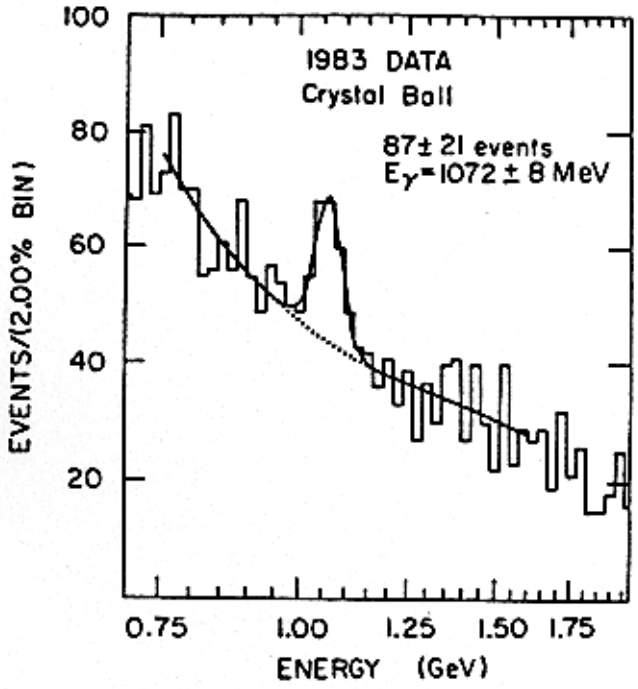
- Priority to Crystal Ball Physics Program

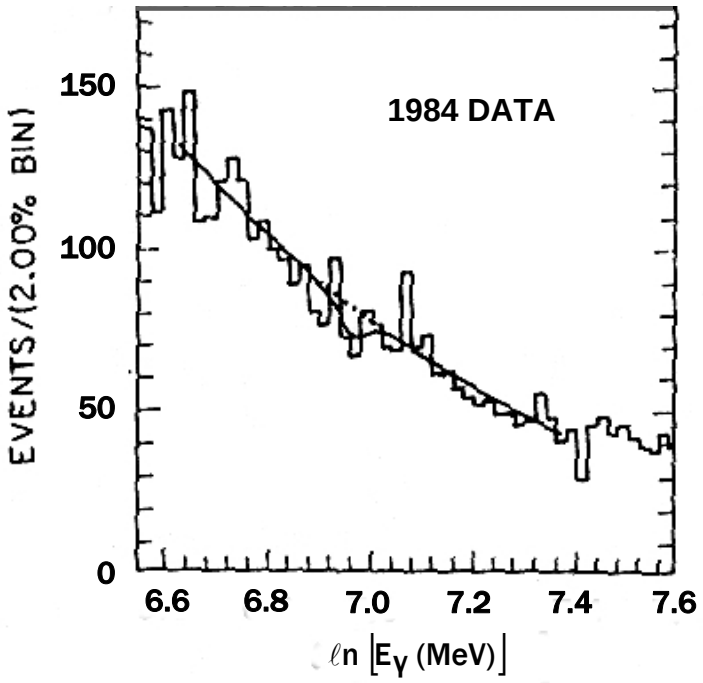
Why ?

— running detector

— Crystall Ball established and successful collaboration with respectable record of discoveries

— observation $\Upsilon(1S) \rightarrow \gamma$ X





- 1984 signal not reproduced
- 1986 "Model which might explain disappearances"

No signal either

D.R.O.M.: " … there are a number of published results which seem exciting and caused great activity, but are finally found to be wrong. It is not easy to say precisely how this occurs, may be by constantly repeating it to one another a surprisingly result becomes acceptable. The problem is when it becomes an article of faith for members of the Collaboration to believe the result."

DESY Annual report:

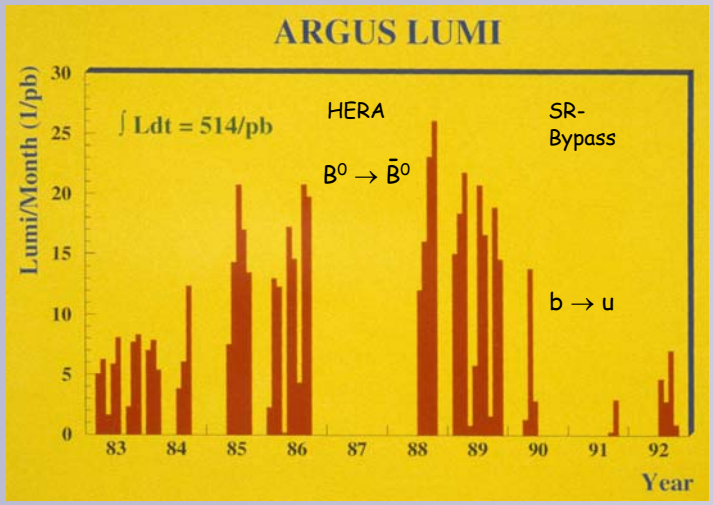
1984: The differences of the 1983 and 1984 results are not understood. Studies: different run conditions, check of detector, statistical analysis

1986: The observation of ξ has to be interpreted as statistical fluctuation

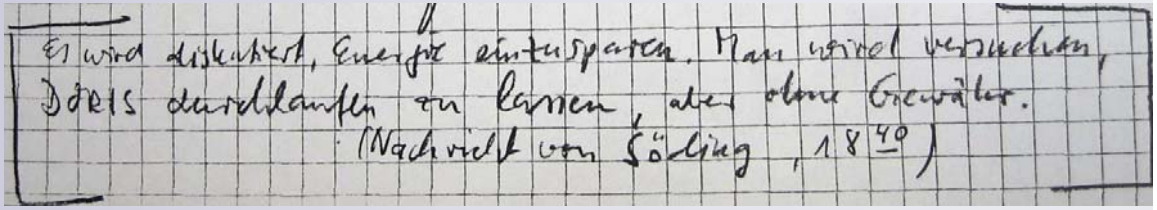
GOETHE: Der Versuch als Mittler zwischen Subjekt und Objekt

" One may notice that a shrewd intellect brings more artifice to bear the fewer data are available; indeed, to demonstrate his mastery he will select from all available data only those few favorable to his views; the remainder he will arrange so as not to obviously contradict his conclusions; and finally hostile data will be isolated, surrounded and disarmed."

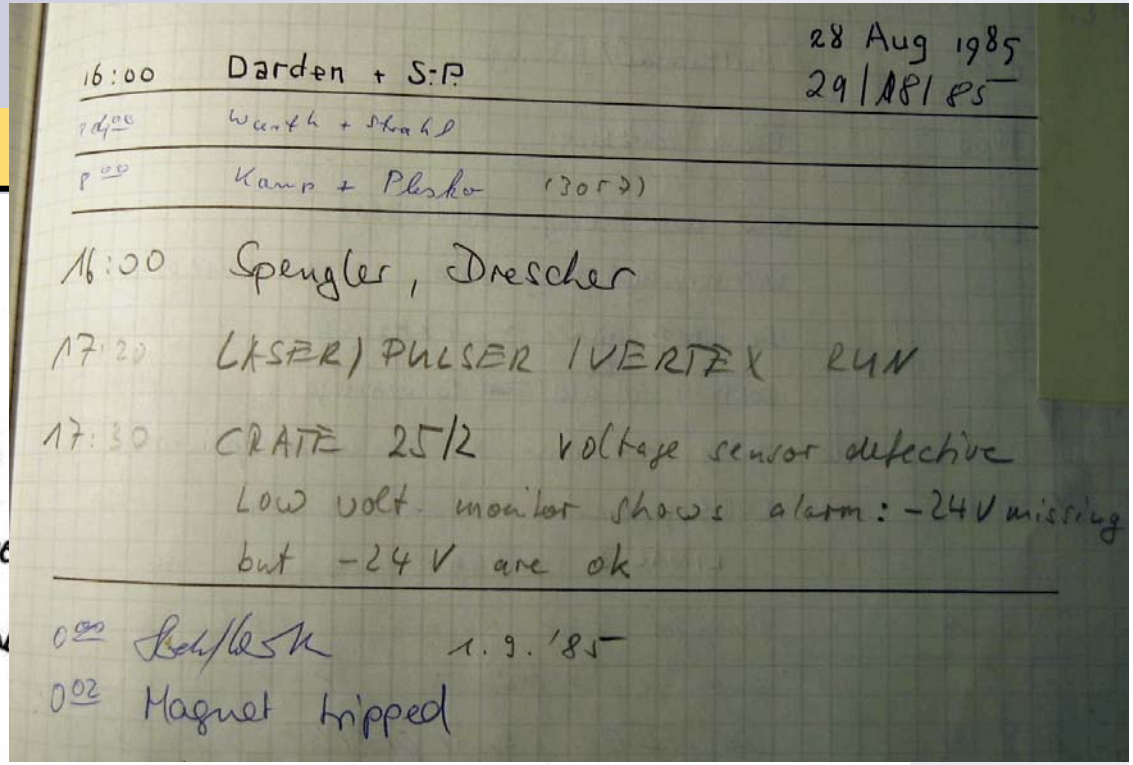
- Priority to Synchrotron radiation



- Electricity Bill



- Problems with DORIS …



16 Apr. 1978 DARDEN

00:00 No beam!

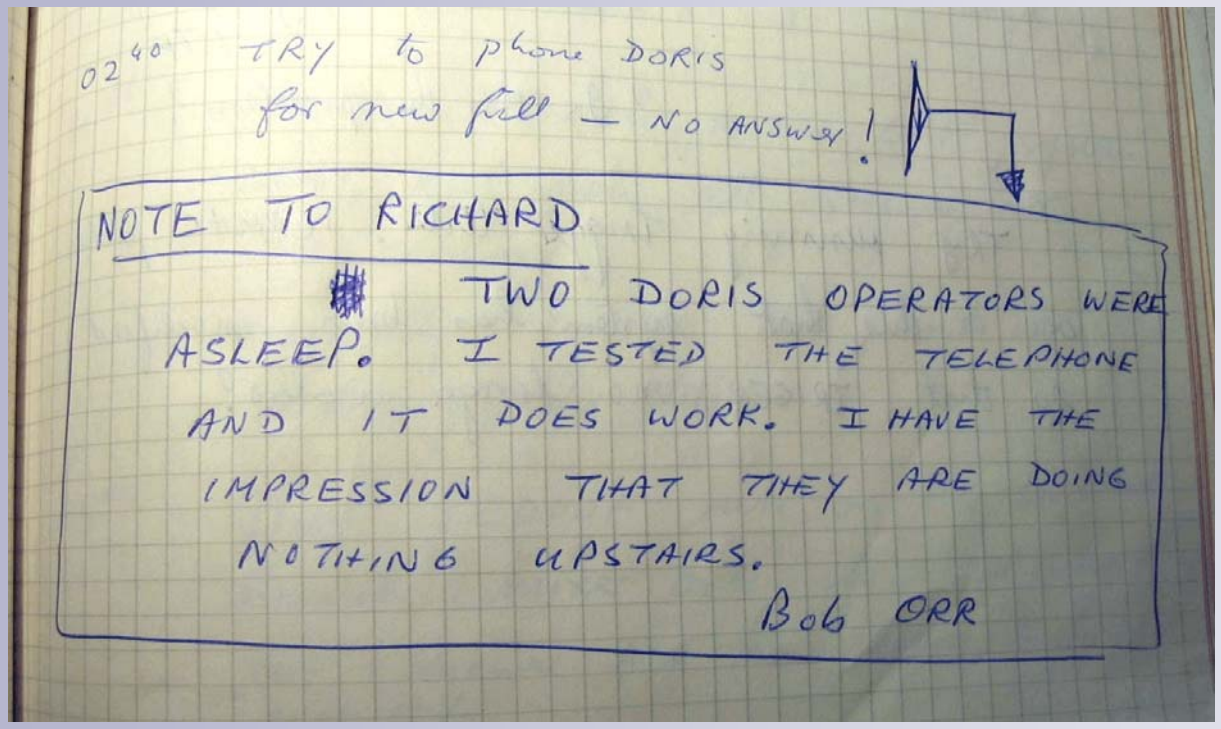
00:19 PDP 11/45 says TIME =

03:00 Still no beam, but the ve

now, 10^{-9} at GPO an

04:00 Still no beam.

04:30 It is beginning to get light outside



02[40] TRY to phone DORIS for new fill — NO ANSWER!

NOTE TO RICHARD

TWO DORIS OPERATORS WERE ASLEEP. I TESTED THE TELEPHONE AND IT DOES WORK. I HAVE THE IMPRESSION THAT THEY ARE DOING NOTHING UPSTAIRS.

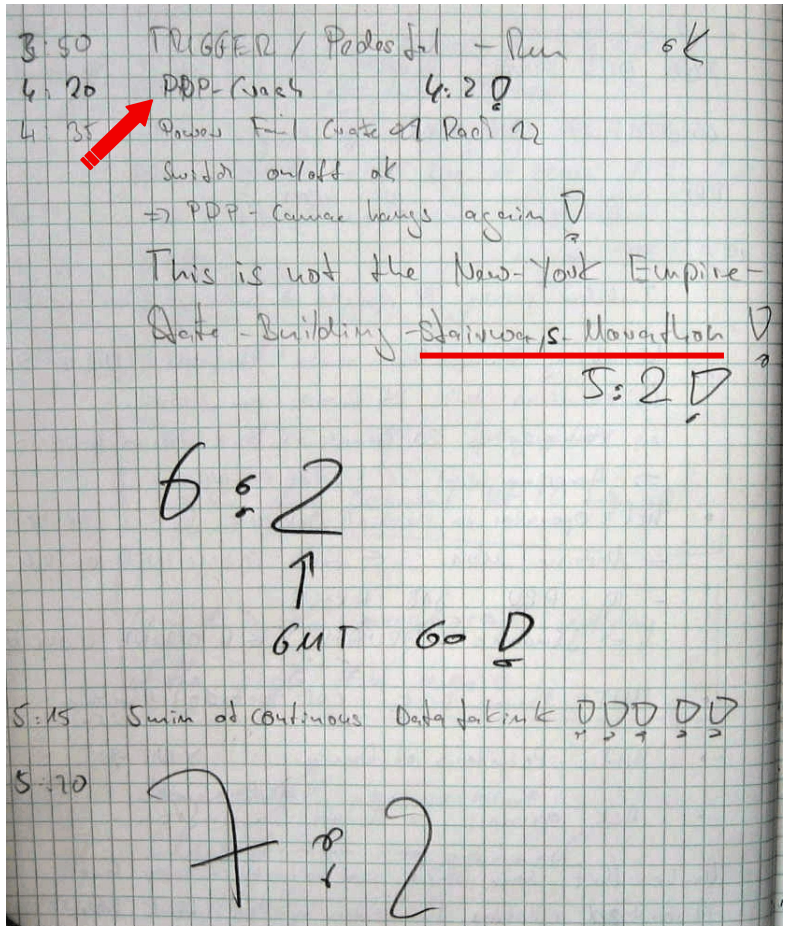
Bob ORR

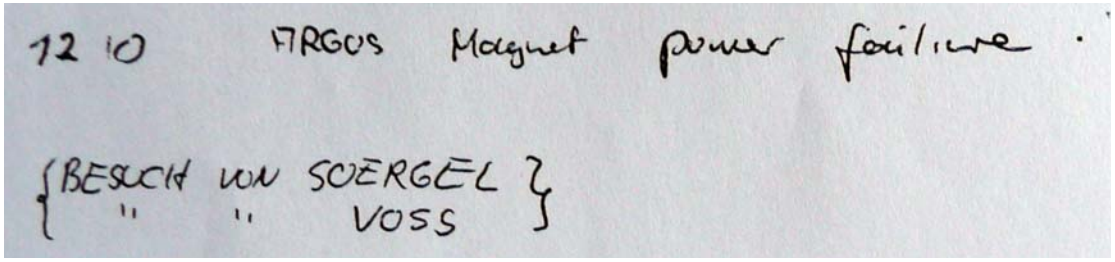
22.39 — Now we can run 15 minutes were "lost" until 22:54 because the DORIS crew had forgotten to reinstall the scrapers.

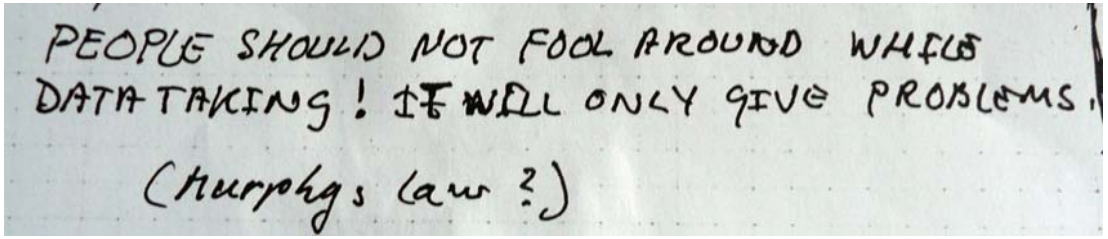
NOTE — IF MISHA AND I HAD NOT GONE TO THE CONTROL ROOM THEY MIGHT NEVER HAVE REMEMBERED.

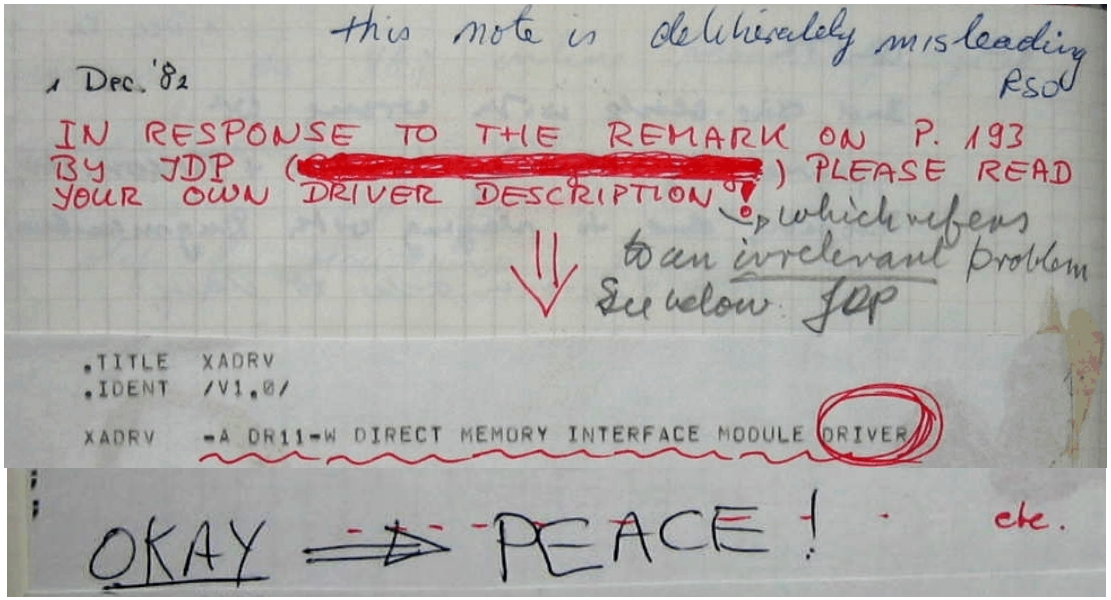
- ARGUS specific problems ...

301	10482	15.4.		-300	4.6750	Schroff
"	10483	"		"	"	Mist



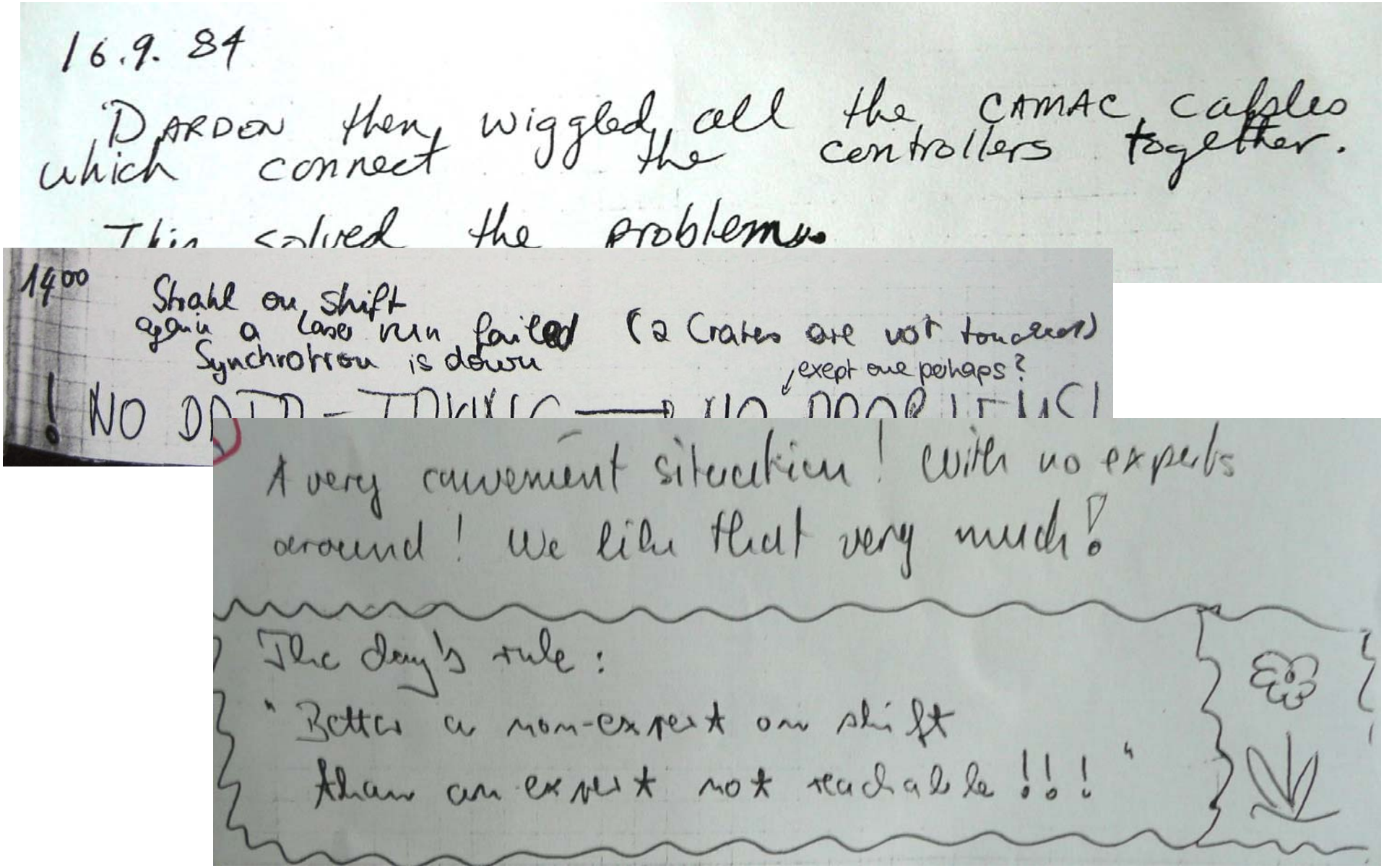




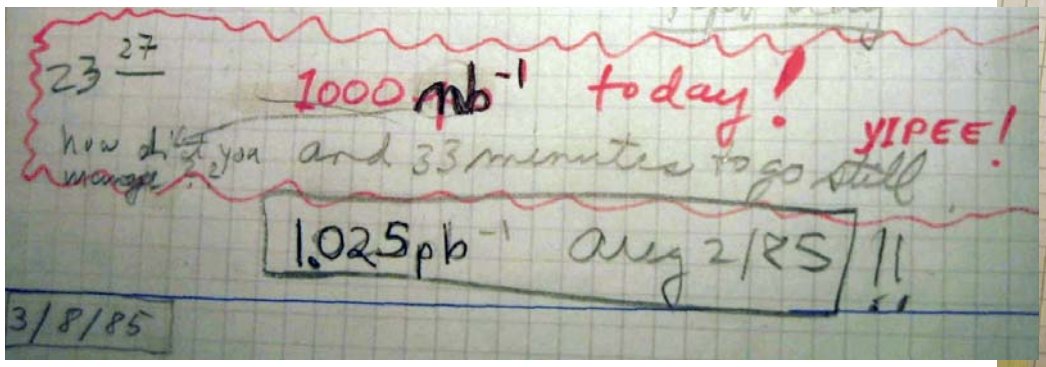


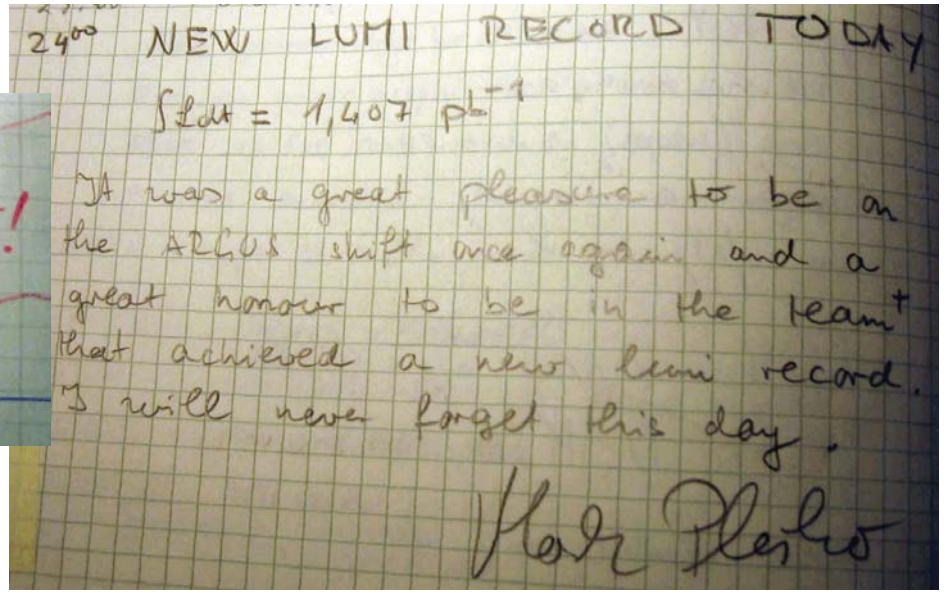
Consolation

The man with the **Magic Touch**

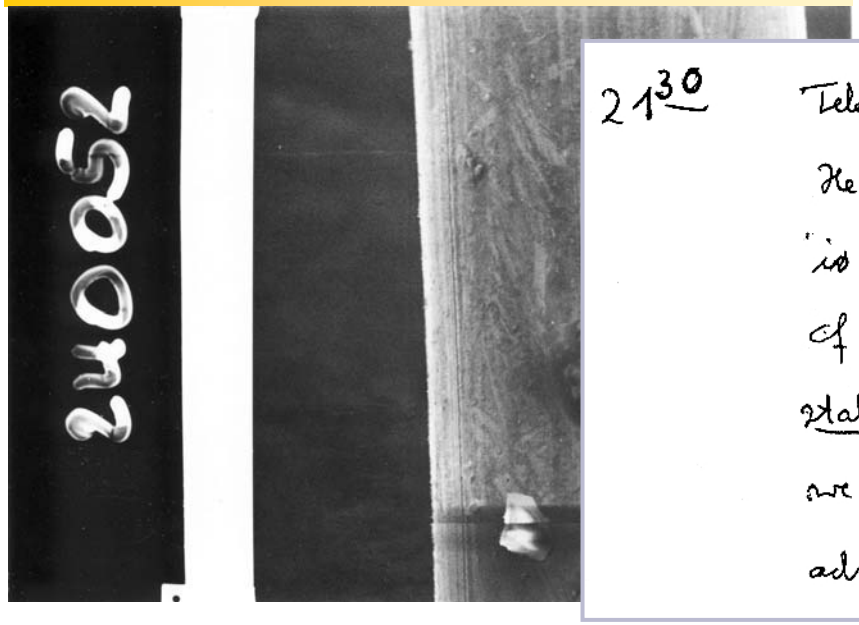


But also happy days





- The real problem: Aging of DC



- Solution: Water/alcohol

21³⁰ Telephon call from USP

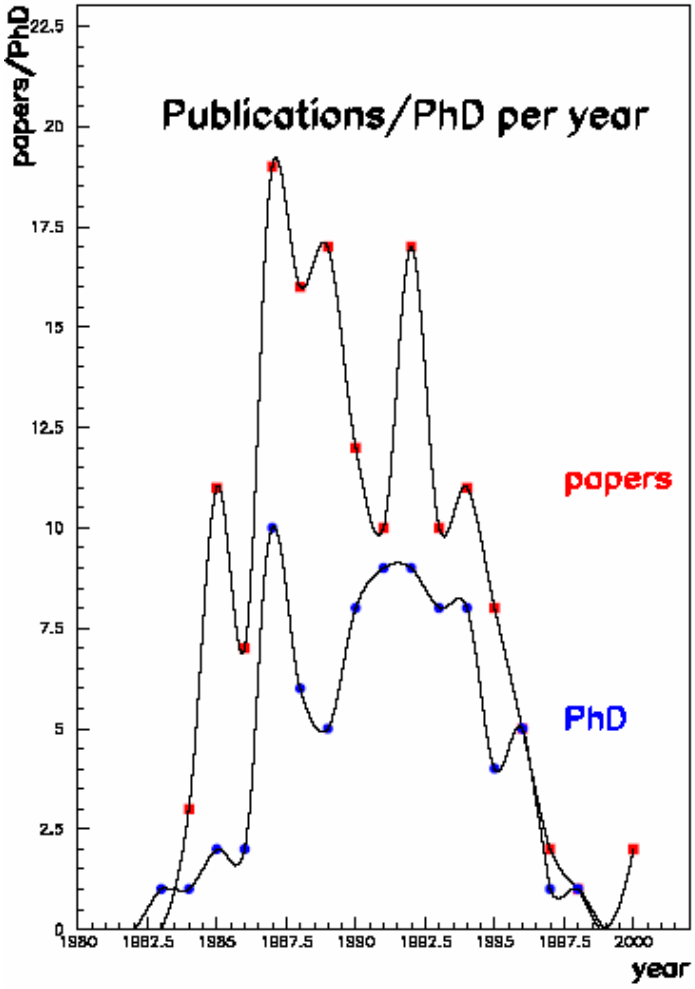
He got from two independent groups (Lekuhaus + Charm, were it is a standard procedure) the information that an admixtion of ¼ saturation pressure ~~of~~ H_2O addition to the chamber gas stabalises the conditions. In order not to worsen the running we put ② to 1850 V. Should stay there until the H_2 admixture procedure is set up

D. W.

Why was ARGUS so successful ?

WSP 1977: Why

DORIS = gold mine



Unexpected authors

The Decay $D^0 \to \bar{K}^0 \phi$

ARGUS Collaboration

H. Albrecht, U. Binder, P. Böckmann, R. Gläser, G. Harder, I. Lembke-Koppitz, W. Schmidt-Parzefall, H. Schröder, H.D. Schulz, R. Wurth, A. Yagil [1]
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University of South Carolina [12], SC 29208, USA

H. Gennow
University of Stockholm, S-11346 Stockholm, Sweden

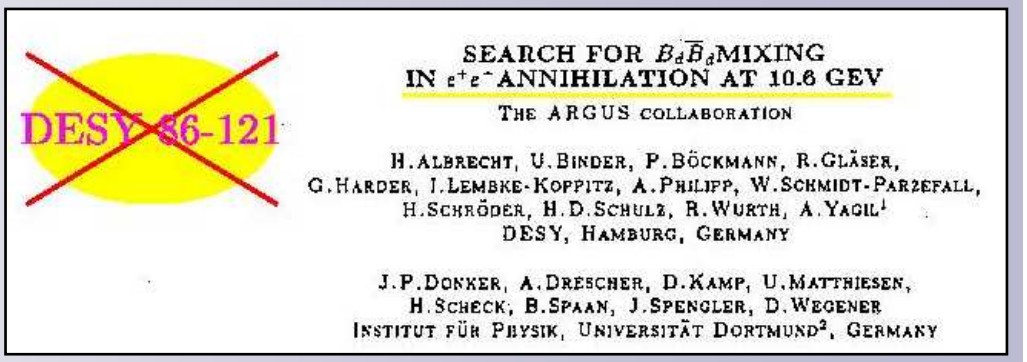
J. Stefan
ty, YU-61000 Ljublj

- How wrong results were avoided

D_s–Meson DESY 84–043 (May 1984)
Submited to Phys.Lett.B 5.1.985

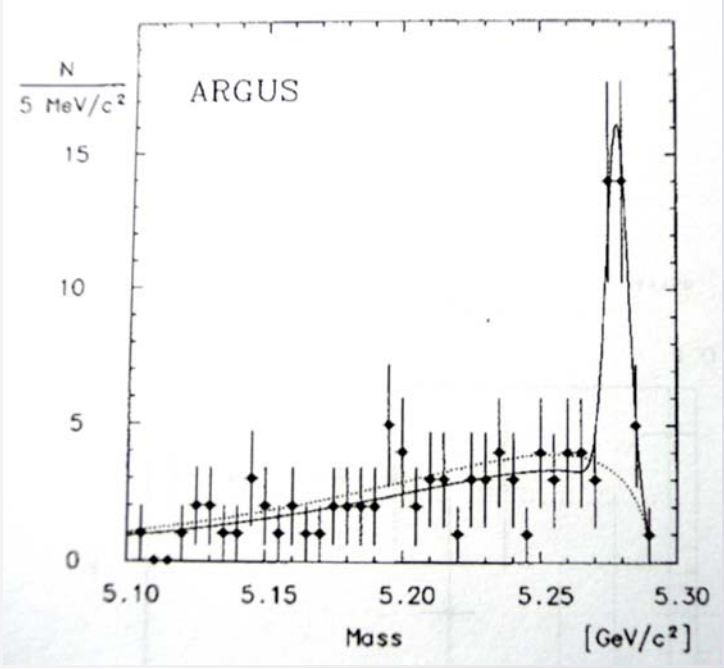
DESY 86–121

Contribution of reflection uncovered early enough



Nowadays: R.D.Kohaupt, Damping of Multibunch Oscillations
H.S. stopped delivery last moment

- The real problem



$B^+ \to p\bar{p}\,\pi^+$ exists, but
Br factor ~ 100 smaller

Reaction
- $b \to u$ semileptonically observed and published
- introduction of formal referee system

d) Importance of Social Life

Collaboration meetings

Trained spokesman

No photo: Heidelberg, Moskau, Montreal, Stade

- Weekly meetings at DESY
- e-mail exchange

e) Careers

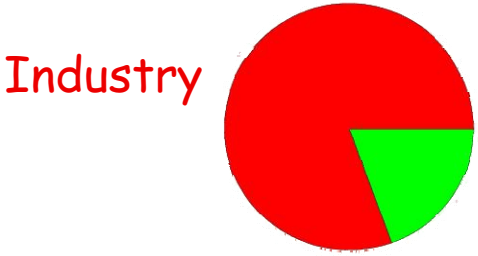
Seniors
K. Schubert
W. Schmidt-Parzefall
M. Danilov
H. Kolanoski

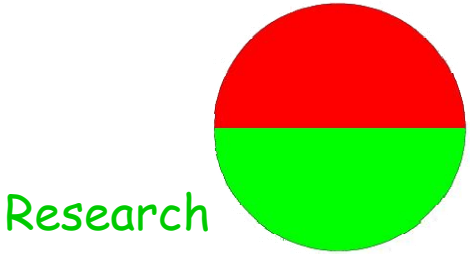
Postdocs
D.B. MacFarlane
W. Hofmann
H. Schröder
P. Krizan
A. Golutvin

PhD
B. Spaan
S. Schael
T. Ruf
G. Herrera
M. Paulini
S. Westerhoff
J.A. McKenna
J. Parsons
⋮

Industry
D. Kamp
B. Gräwe
D.Töpfer
⋮

ARGUS: Present position of former PhD students



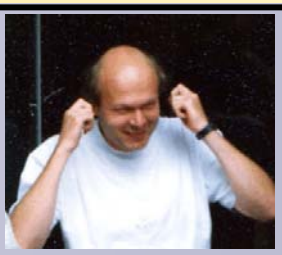


81 PhD students

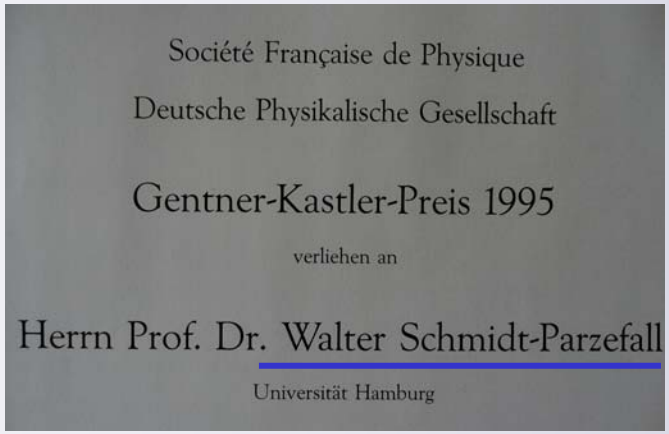
101 Diploma/Master students

Prizes

B. Spaan 1989 **Benno-Orenstein-Preis** für seine Arbeiten auf dem Gebiet der Hochenergiephysik



D.B. MacFarlane 1991 Herzberg Medal
1995 Rutherford Medal



M. Danilov 1996 Max-Planck-Forschungspreis

C. Darden 2004 Russell Research Award

Division of Particles & Fields

1997 W.K.H. Panofsky Prize in Experimental Particle Physics Recipient

Henning Schröder
DESY

Citation:

"*For their leading role in the first demonstration of mixing in the BO – B–O system. The unexpectedly large value of the mixing parameter provided indirect evidence for a large top quark mass and has greatly enhanced the possibility for studying CP violation in B meson decays. This capability has encouraged a worldwide effort to determine whether the small CP violation in K decay is a reflection of a fundamental parameter characterizing transitions of quarks among the three generations.*"

1997 W.K.H. Pañofsky Prize in Experimental Particle Physics Recipient

Yuri Mikhailovich Zaitsev
Institute of Theoretical and Experimental Physics

Citation:

"*For their leading role in the first demonstration of mixing in the BO – B–O system. The unexpectedly large value of the mixing parameter provided indirect evidence for a large top quark mass and has greatly enhanced the possibility for studying CP violation in B meson decays. This capability has encouraged a worldwide effort to determine whether the small CP violation in K decay is a reflection of a fundamental parameter characterizing transitions of quarks among the three generations.*"

Why was ARGUS so successful ?

- Detector design optimal for pattern recognition
- Responsibilities not changed
- Hermiticity of detector
- Special effective analysis software (H. Albrecht)
- "Best" simulation software (H. Gennow)
- Excellent PhD students
- Original ideas
- A little bit of luck
- Gold mine
- Friendly competition with CLEO

Wisdom of a real gentleman

12.5.78

15:00 DARDEN

16:00 New filling

16:50 Start run 909.

17:25 IBM Problems.

19:35 The celebration is still going on in the PLUTO controll room. Hvor Dr. Prof. Timm is not there any more, but a few stalwarts are dancing and drinking and showing good spirits. The BAZY cleaning crew isn't doing much cleaning, just cleaning up the remaining liquid in their glasses. In general, it seems that some people, at least, have figured out what life is all about and are making up for lost time. The DASP

Why was ARGUS so successful ?

⇒ ARGUS' theme for this evening:

"What we call the beginning is often the end
and to make an end is to make a beginning.
The end is where we start from."

(T. S. Eliot)