IEEE NPSS Student Branch Chapter
Universidad Simón Bolívar

BEIS 2026

A Career in Physics

Martin Grossmann

Center for Protontherapy, Paul Scherrer Institute, Switzerland

Barranquilla, Colombia · June 2026

About myself…

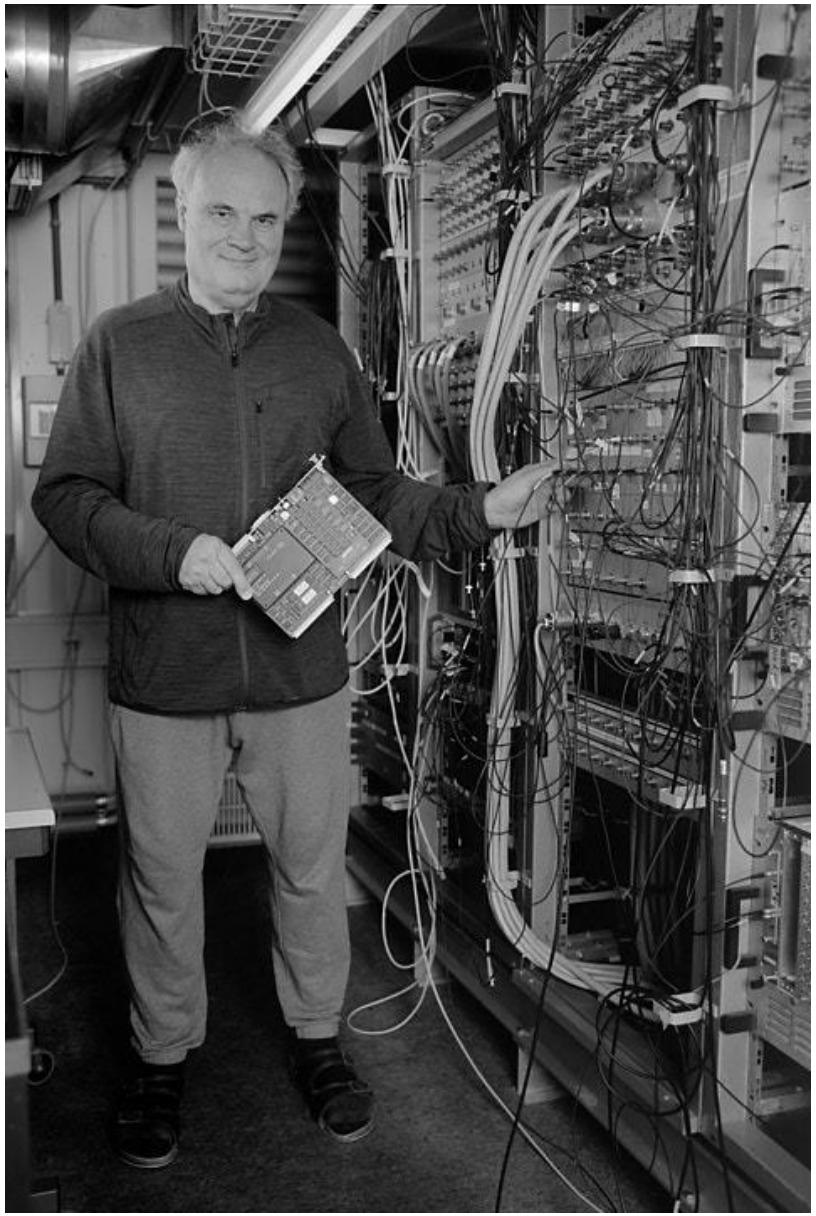
Born in 1960

Studied physics

Worked in particle physics and in radiation therapy

Message:

Life as a physicist can be very interesting & colourful



Highschool

- Provincial town in Germany, bored
- Got interested in astronomy

1976

Highschool

Texas Instruments SR-52
(1975-1977)

Comet West 1976

Comet West

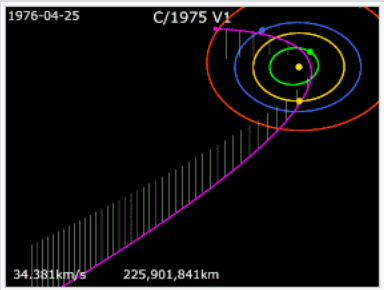
26 languages

Article Talk | Read Edit View history Tools

From Wikipedia, the free encyclopedia

Comet West, formally designated **C/1975 V1**, **1976 VI**, and **1975n**, was a comet described as one of the brightest objects to pass through the inner Solar System in 1976. It is often described as a "great comet."[3]

History [edit]



Animation of C/1975 V1 orbit around Sun
C/1975 V1 · Sun · Mercury · Venus · Earth · Mars

It was discovered photographically by Richard M. West, of the European Southern Observatory, on August 10, 1975. The comet came to perihelion (closest approach to the Sun) on February 25, 1976.[1] During perihelion the comet had a minimum solar elongation of 6.4° and as a result of forward scattering reached a peak apparent magnitude of −3.[2] From February 25–27, observers reported that the comet was bright enough to study during full daylight.[2]

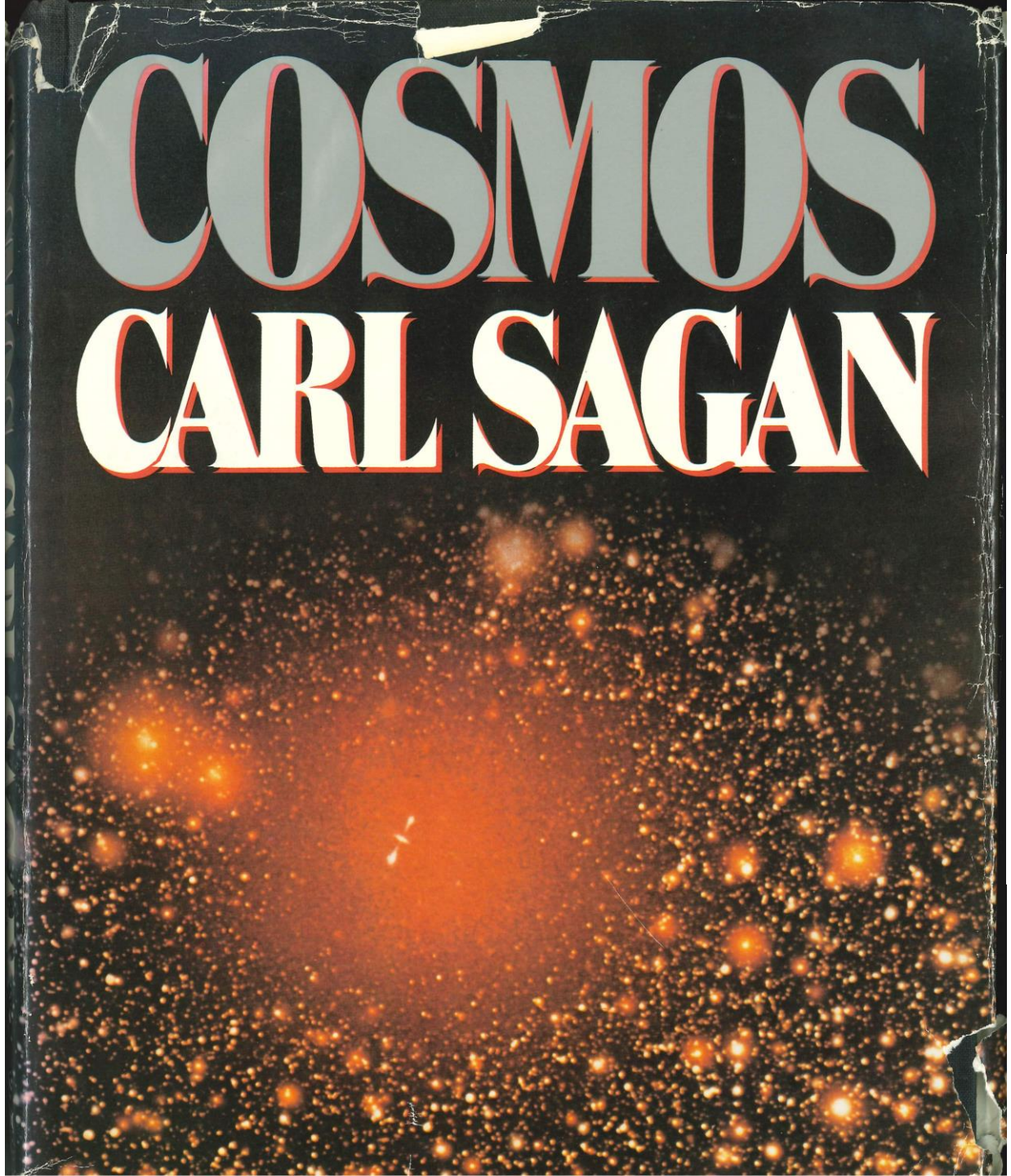
Despite its brightness, Comet West went largely unreported in the popular media. This was partly due to the relatively disappointing display of Comet Kohoutek in 1973, which had been widely predicted to become extremely prominent: scientists were wary of making predictions that might raise public expectations.[4]

The New York Times, however, reported on March 2, 1976 that West was "a comet that may prove one of the brightest in this decade" and would be "visible to the unaided eye."[5]

C/1975 V1 (West)
(Great Comet of 1976)


Comet West on March 9, 1976

Discovery	
Discovered by	Richard M. West
Discovery date	August 10, 1975
Designations	
Alternative designations	1976 VI, 1975n
Orbital characteristics	
Epoch	1976-Mar-03 (JD 2442840.5)[1]
Aphelion	1,500 AU (inbound)
Perihelion	0.197 AU[1][2]
Eccentricity	0.99997[1] (near parabolic)
Orbital period	chaotic (estimates up to 558,000 years)



Cosmos: A Personal Voyage

"Travellers' Tales" redirects here. For the video game company, see Traveller's Tales. For the book based on the series, see Cosmos (Sagan book).

Cosmos: A Personal Voyage is a thirteen-part, 1980–81 television series written by Carl Sagan, Ann Druyan, and Steven Soter, with Sagan as presenter. It was executive-produced by Adrian Malone, produced by David Kennard, Geoffrey Haines-Stiles, and Gregory Andorfer, and directed by the producers, David Oyster, Richard Wells, Tom Weidlinger, and others. It covers a wide range of scientific subjects, including the origin of life and a perspective of our place in the universe. Owing to its bestselling companion book and soundtrack album using the title, ***Cosmos***, the series is widely known by this title, with the subtitle omitted from home video packaging. The subtitle began to be used more frequently in the 2010s to differentiate it from the sequel series that followed.

The series was first broadcast by the Public Broadcasting Service in 1980, and was the most widely watched series in the history of American public television until *The Civil War* (1990). As of 2009, it was still the most widely watched PBS series in the world.[1] It won two Emmys and a Peabody Award, and has since been broadcast in more than 60 countries and seen by over 500 million people.[2][3] A book was also published to accompany the series.

Cosmos: A Personal Voyage has been considered highly significant since its broadcast; David Itzkoff of *The New York Times* described it as "a watershed moment for science-themed television programming".[4]

Cosmos: A Personal Voyage	
	
Genre	Documentary
Created by	Carl Sagan Ann Druyan Steven Soter
Directed by	Adrian Malone
Presented by	Carl Sagan
Composers	Vangelis; various artists
Country of origin	United States
Original language	English
No. of seasons	1
No. of episodes	13

Comet West, photographed from Earth in February 1976 by Martin Grossman of Gromau, West Germany. The great tail is blown away from the icy nucleus of the comet by a wind of protons and electrons from the Sun, which has set below this horizon.

Chapter IV

HEAVEN AND HELL

Nine worlds I remember.

—The Icelandic Edda of Snorri Sturluson, 1200

I am become death, the shatterer of worlds.

—*Bhagavad Gita*

The doors of heaven and hell are adjacent and identical.

—Nikos Kazantzakis, *The Last Temptation of Christ*

THE EARTH IS A LOVELY AND MORE OR LESS PLACID PLACE. Things change, but slowly. We can lead a full life and never personally encounter a natural disaster more violent than a storm. And so we become complacent, relaxed, unconcerned. But in the history of Nature, the record is clear. Worlds have been devastated. Even we humans have achieved the dubious technical distinction of being able to make our own disasters, both intentional and inadvertent. On the landscapes of other planets where the records of the past have been preserved, there is abundant evidence of major catastrophes. It is all a matter of time scale. An event that would be unthinkable in a hundred years may be inevitable in a hundred million. Even on the Earth, even in our own century, bizarre natural events have occurred.

In the early morning hours of June 30, 1908, in Central Siberia, a giant fireball was seen moving rapidly across the sky. Where it touched the horizon, an enormous explosion took place. It leveled some 2,000 square kilometers of forest and burned thousands of trees in a flash fire near the impact site. It produced an atmospheric shock wave that twice circled the Earth. For two days afterward, there was so much fine dust in the atmosphere that one could read a newspaper at night by scattered light in the streets of London, 10,000 kilometers away.

Arianna Savall, Petter Udland Johansen El cant de la Sibil.la Draumkvedet	Carpe Diem Records

El Cant de la Sibil.La & Draumkvedet

Petter Udland Johansen (Artist), Arianna Savall (Artist), Various (Composer)

5.0 ★★★★★ 5 ratings

$22.36

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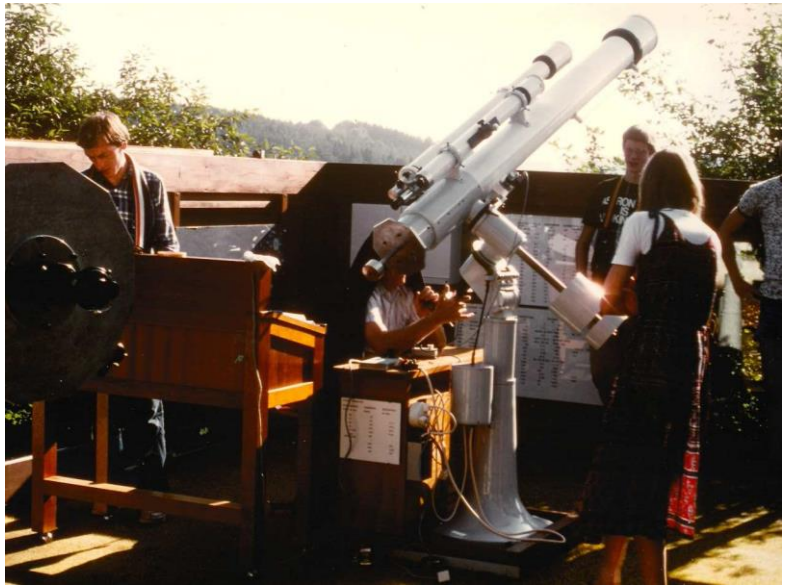
International Astronomical Youth Camps 1975 - 1981

1975 – 1978 as participant, 1979 – 1981 as organizer

International community with common interest

Work together but also have fun

Networking, meet young professionals in astronomy



International Astronomical Youth Camps 1975 - 1981

Organizing conferences, schools, IEEE… already learned skills back then

1981

2023

www.iayc.org

National Science Contest 1978-1979

jugend forscht

Discussions in IAYC lead to participation in German national science contest

1978: got kicked out early ☹

1979: try again

Monte Carlo simulation of comet breakup generating a meteor shower

→ 2nd winner nationwide ☺

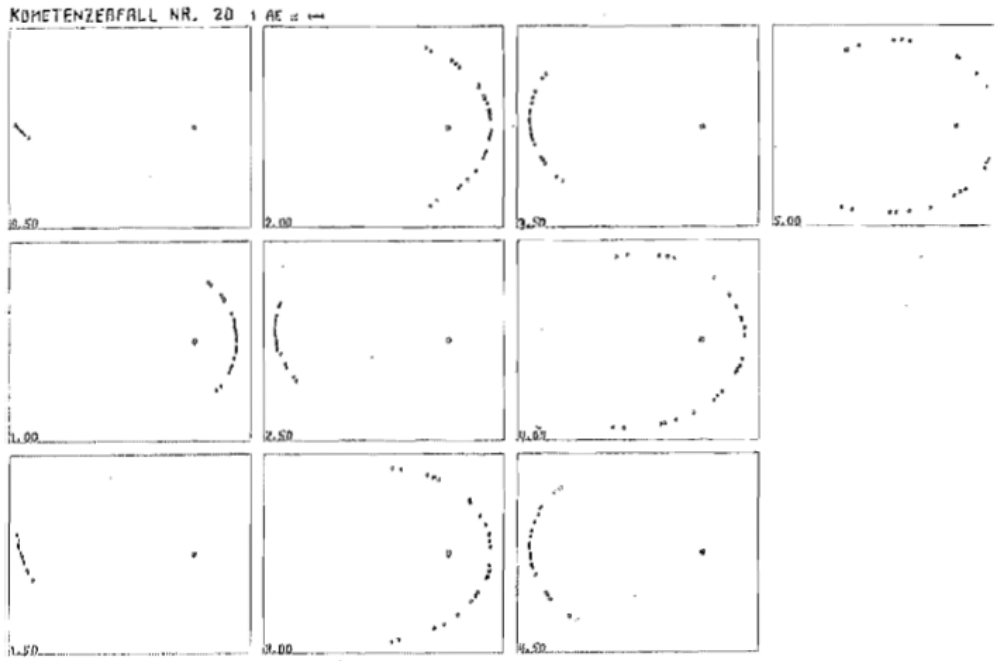


Abb. 1: Computersimulation einer Meteorstromentstehung aus dem Zerfall eines Kometenkerns. Die mit unterschiedlichen Geschwindigkeiten aus dem Kern austretenden Teilchen verteilen sich über die Bahn des Ursprungskometen. Die gezeigten Einzelstadien stellen die Teilchenpositionen in Abständen einer halben Umlaufzeit des Kometen dar (Zahlenangaben links unten in jedem Kästchen).

jugend forscht

Attend Nobel Prize ceremony in 1979

NOBELSTIFTELSENS MIDDAG

Stockholms Stadshus

den 10 december 1979

efter prisutdelningen

Avd. I Nobelgäster
Avd. II Studenter

DELTAGARE I MIDDAGEN

BOKSTAVSORDNING I

Övriga gäster och studenter finns upptagna i Bokstavsordning II

Siffrorna hänvisar till bordsplanen

19 H.M. KONUNGEN
59 H.M. DROTTNINGEN
17 H.K.H. HERTIGEN AV HALLAND
61 H.K.H. HERTIGINNAN AV HALLAND

147 Abrahamsson, Sixten, professor
134 Abrahamsson, Kerstin, fru
151 Acking, Carl-Axel, professor
160 Acking, Gullan, fru
447 Ahlgren, Lennart, direktör
153 Almling, Sten, länsassessor
188 Almling, Margareta, högskole-direktör
287 Althin, Margit, advokat
87 Andersson, Bengt, professor
88 Andersson, Marianne, veterinär
123 Andréasson, Gunnar, fil. mag.
577 Andréasson, Katina, fru
201 Andrén, Carl-Gustaf, professor
651 Andrén, Karin, förlagsredaktör
297 von Arbin, Claës M., direktör
315 von Arbin, Marie Louise, fru
31 Awan, Azmat Baksh, Ambassador of Pakistan
8 Awan, Asmat, Begum
129 Axell, Bo, fil. dr
511 Axell, Eva, fru
484 Axelsson, Thomas, med. stud., *marskalk*
449 Bader, Richard, Professor
412 Bajwa, B., Mrs.
458 Barr, Magnus, teknolog
365 Bates, S. R., Mr.
684 Beall, Donald R., Mr.
705 Beall, Donald R., Mrs.
532 Beckman, Lars, professor
531 Beckman, Gunhild, professor
204 Bendz, Gerd, professor
135 Bengtsson, Elias, professor
21 Bengtsson, Ingemund, talman
114 Bengtsson, Margareta, fru
721 Bengtsson, Roland, direktör
731 Bengtsson, Siv, fru
566 Bennet, Inga, friherrinna
616 Bentzel, Ragnar, professor
644 Bentzel, Birgit, fru
578 Berendsen, Herman, professor
570 Berendsen, Herman, fru
299 Bergenström, Gullmar, direktör
152 Bergenström, Hélène, fru
181 Bergstedt, Tord, sjukvårds-direktör
489 Bergstedt, Margareta, fru

Bord 30

851 Sendrén, Lars-Göran, civilingenjör
852 Papay, Martha, miss
853 Schildt, Johan, stud.
855 Grossman, Martin, stud.
860 Daun, Kristina, ekon. st
859 Zupan, Andrew, Mr.
858 Eliason, Ellen K., miss
857 Tysiazny, Chris, stud.
856 Griffiths, Anne, miss

Bord 31

861 Steen-Johnsen, Ivar, stud.
862 Hedin, Märta, lab. ass.
863 Baldridge, William, stud.
864 Möller, Susanna, stud.
865 de Bruijne, F. J., stud.
870 Mercado, Rafael, stud.
869 Cuijpers, A., stud.
868 Carlsson, Mats, stud.
867 Fagernæs, Kari, stud.
866 Schiller, Wolfgang, stud

Bord 32

871 Röed, Erik, herr
872 Chang, Mildred, stud.
873 Martens, A., stud.
874 Cofresi, Mayidel, stud.
875 Hedin, Lars, stud.
880 Capriles, Viktor, herr
879 Recén, Boel, stud.
878 Ohrling, Mikael, stud.
877 Tiselius, Maria, sekretera
876 Luft, Alexander, stud.

Bord 33

881 Ellström, Einar, byggn. ing.
882 Ramer, Annalena, med. kand.
883 Schylander, Per-Olov, byggnads-ingenjör
884 Ellström, Inga Britt, fru
885 Cason, Sven-Åke, bankdirektör
890 Schylander, Ingegerd, fr
889 Olderius, Karl-Gustav, s
888 Granström, Cecilia, tekn
887 Wilén, Tomas, leg. läkare
886 Cason, Kjerstin, läkarsek

Studying Physics 1979 – 1985 (Master)

Study the basics (physics, mathematics) in Münster, Germany

Also astronomy → get student job in the astronomical institute

Observing with professional equipment

First publication

But: frustration that you can only watch, not do experiments

→ Take a break for 1 year, do something else

Positions of Comet P/Tuttle (1980h)

by

M. Grossmann

Astronomisches Institut der Universität Münster, F.R.G.

and

H. W. Duerbeck*

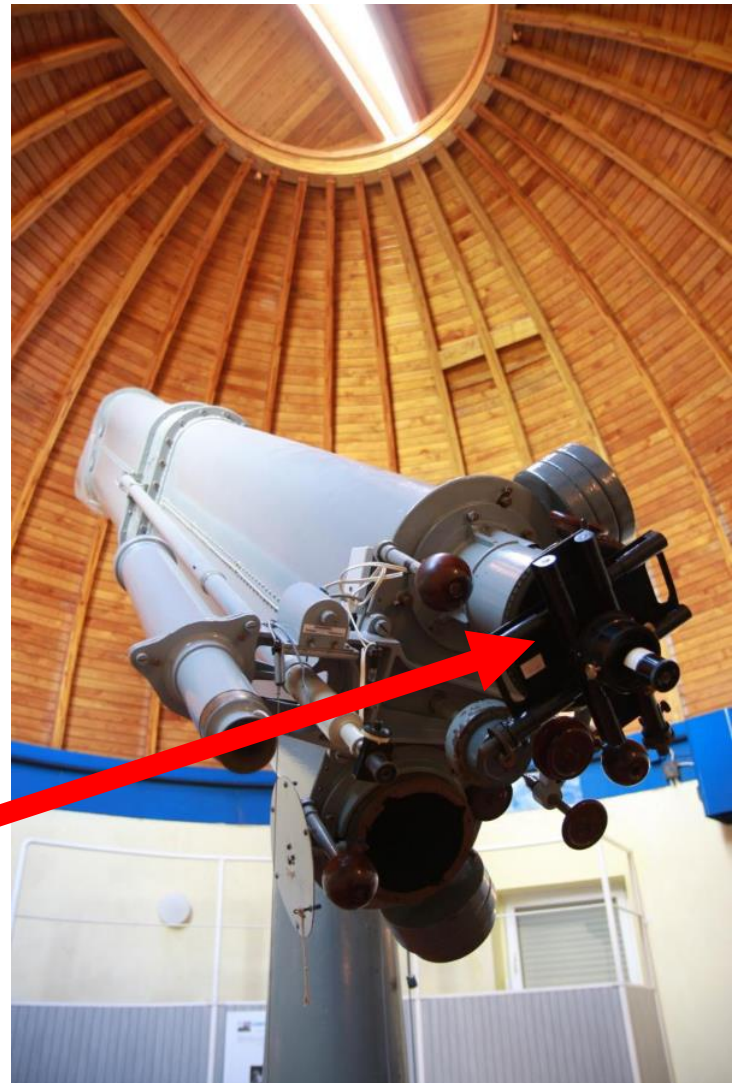
Sternwarte der Universität Bonn, F.R.G.

Received May 10, 1981

ABSTRACT

12 positions of comet P/Tuttle (1980h) are derived from photographic observations made with the GPO telescope of ESO between 1980 December 26 and 1981 January 9.

Photographic observations of comet P/Tuttle (1980h) were made with the 400/4000 mm GPO astrograph at the European Southern Observatory. The exposure time was either 30 or 60 seconds. The plates were measured with the digitized Komess measuring engine of the Hoher List Observatory (Hoffmann and Geffert 1979). The comet always had a fuzzy appearance,



«Sabbatical» 1983/84

Plasma fusion – Tokamak at EPFL, Lausanne, Switzerland

Working in instrumentation and data analysis

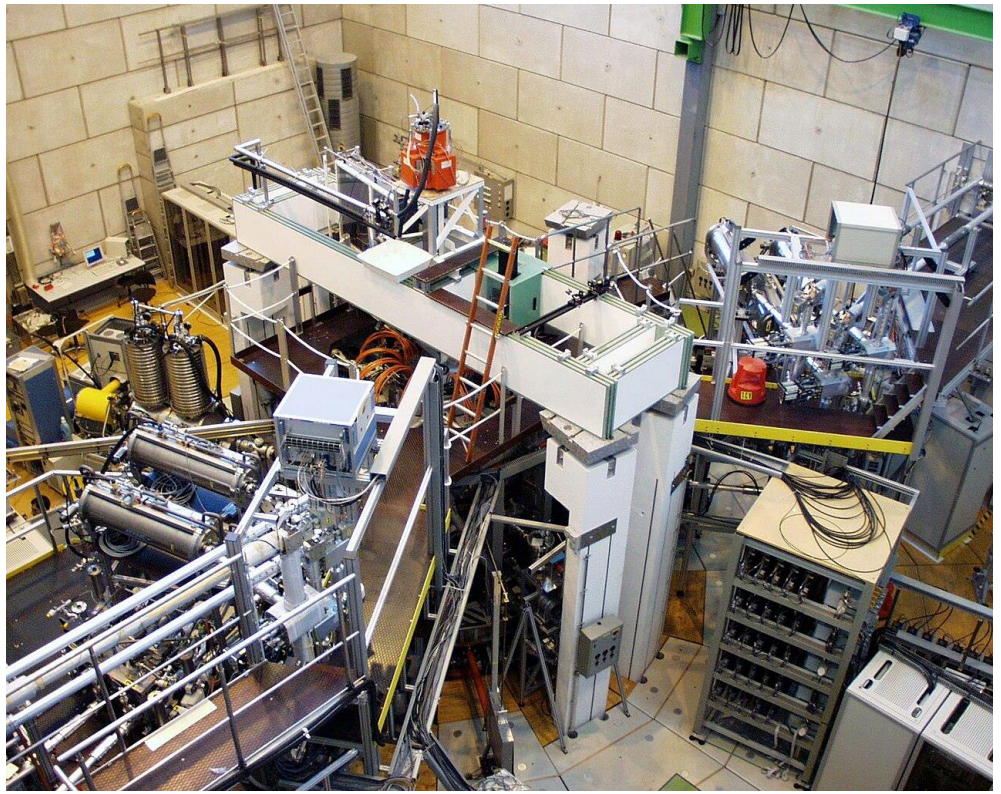
Read textbook on fusion from cover to cover

Understand that:

- These machines are supercomplex
- Must breed tritium from lithium
- Radiological & chemical hazard
- Resources limited

Conclusion: this will take a long time before success!

→ Try to get into high energy physics…

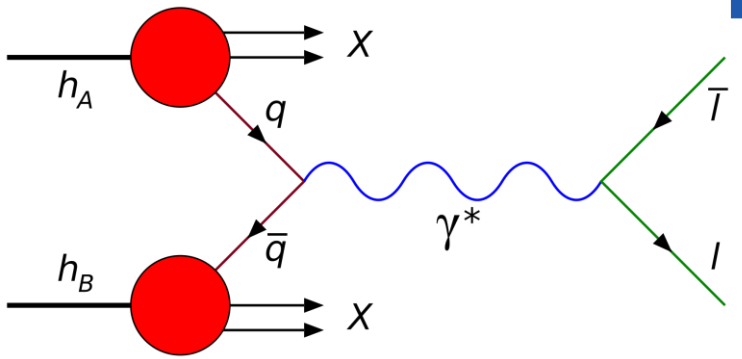


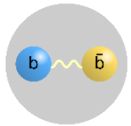
Tokomak TCA, Lausanne 1983

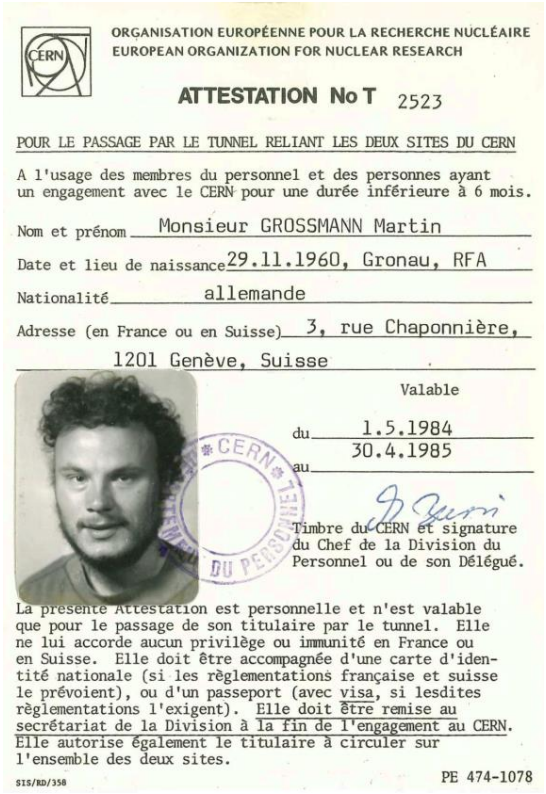
Master thesis 1984/85

NA10: fixed target experiment at CERN SPS

Study Drell Yan process (test of Standard Model)



Byproduct: production of Ypsilon meson 



ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLÉAIRE
EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

ATTESTATION No T 2523

POUR LE PASSAGE PAR LE TUNNEL RELIANT LES DEUX SITES DU CERN

A l'usage des membres du personnel et des personnes ayant un engagement avec le CERN pour une durée inférieure à 6 mois.

Nom et prénom: Monsieur GROSSMANN Martin

Date et lieu de naissance: 29.11.1960, Gronau, RFA

Nationalité: allemande

Adresse (en France ou en Suisse): 3, rue Chaponnière, 1201 Genève, Suisse

Valable du 1.5.1984 au 30.4.1985

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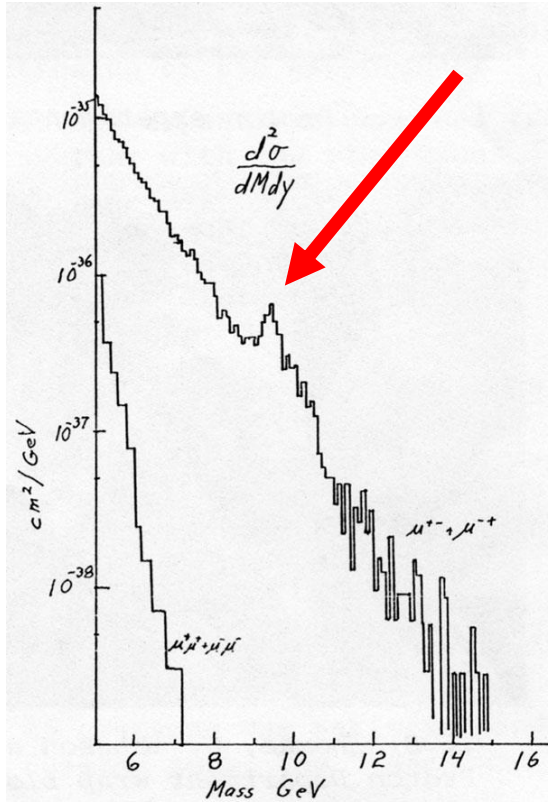
La présente Attestation est personnelle et n'est valable que pour le passage de son titulaire par le tunnel. Elle ne lui accorde aucun privilège ou immunité en France ou en Suisse. Elle doit être accompagnée d'une carte d'identité nationale (si les règlementations française et suisse le prévoient), ou d'un passeport (avec visa, si lesdites règlementations l'exigent). Elle doit être remise au secrétariat de la Division à la fin de l'engagement au CERN. Elle autorise également le titulaire à circuler sur l'ensemble des deux sites.

SIS/RD/350 PE 474-1078

Discovery 1977

(Fermilab, L. Lederman) →



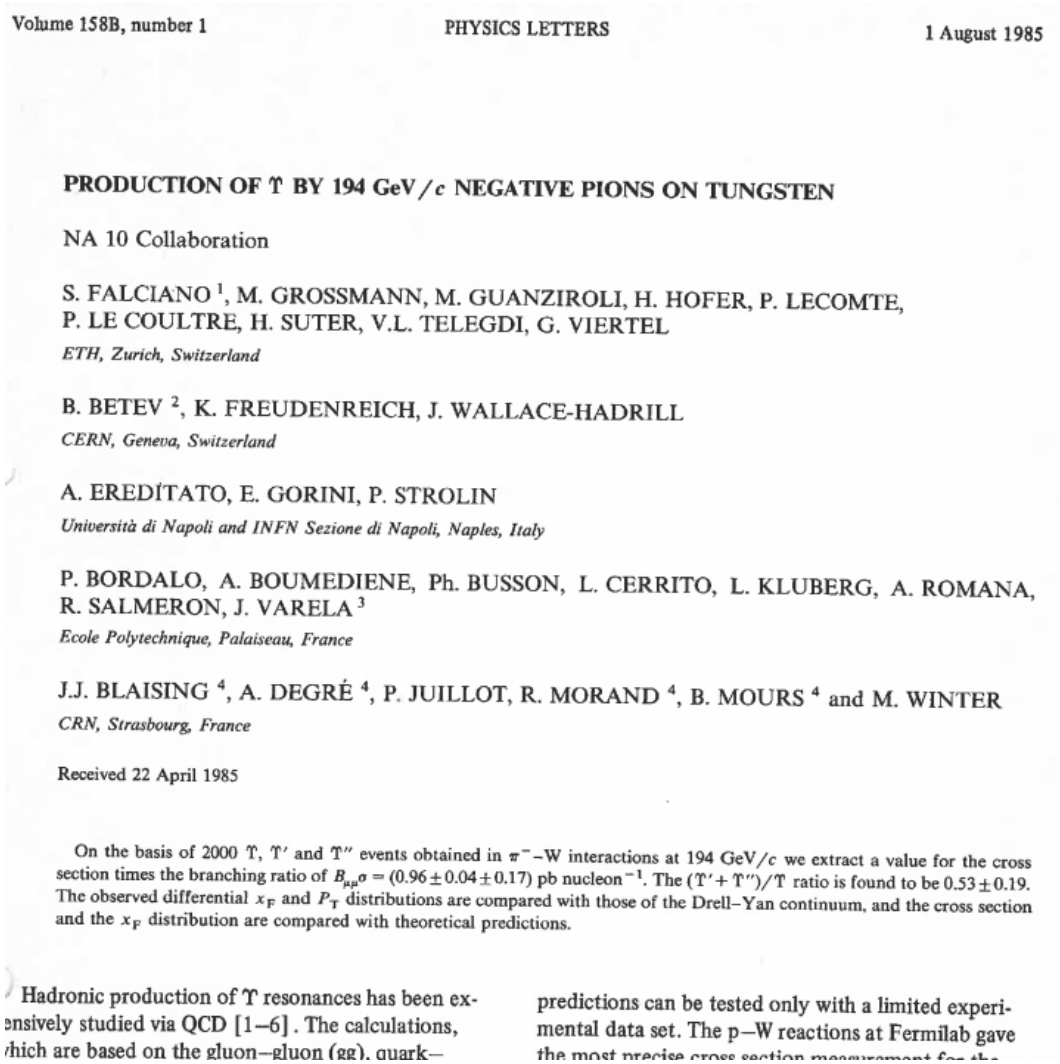
Master thesis 1984/85

NA10: Detector completed, data taking started 1978

My job: data taking, analysis of Y production

Positive:
First time work in international environment
First contact with CERN library tools: HBOOK, GEANT, ...
4 publications
CERN a fascinating place

Negative:
Shifts very boring: night shifts, change magnetic tapes,
If something breaks call somebody
Some people got jealous because of the publications



Volume 158B, number 1 PHYSICS LETTERS 1 August 1985

PRODUCTION OF Υ BY 194 GeV/c NEGATIVE PIONS ON TUNGSTEN

NA 10 Collaboration

S. FALCIANO [1], M. GROSSMANN, M. GUANZIROLI, H. HOFER, P. LECOMTE, P. LE COULTRE, H. SUTER, V.L. TELEGDI, G. VIERTEL
ETH, Zurich, Switzerland

B. BETEV [2], K. FREUDENREICH, J. WALLACE-HADRILL
CERN, Geneva, Switzerland

A. EREDITATO, E. GORINI, P. STROLIN
Università di Napoli and INFN Sezione di Napoli, Naples, Italy

P. BORDALO, A. BOUMEDIENE, Ph. BUSSON, L. CERRITO, L. KLUBERG, A. ROMANA, R. SALMERON, J. VARELA [3]
Ecole Polytechnique, Palaiseau, France

J.J. BLAISING [4], A. DEGRÉ [4], P. JUILLOT, R. MORAND [4], B. MOURS [4] and M. WINTER
CRN, Strasbourg, France

Received 22 April 1985

On the basis of 2000 Υ, Υ′ and Υ″ events obtained in π^-–W interactions at 194 GeV/c we extract a value for the cross section times the branching ratio of $B_{\mu\mu}\sigma = (0.96 \pm 0.04 \pm 0.17)$ pb nucleon^{-1}. The $(\Upsilon' + \Upsilon'')/\Upsilon$ ratio is found to be 0.53 ± 0.19. The observed differential x_F and P_T distributions are compared with those of the Drell–Yan continuum, and the cross section and the x_F distribution are compared with theoretical predictions.

Hadronic production of Υ resonances has been ex-
ensively studied via QCD [1–6]. The calculations,
hich are based on the gluon–gluon (gg), quark–

predictions can be tested only with a limited experi-
mental data set. The p–W reactions at Fermilab gave
the most precise cross section measurement for the

PhD Thesis 1986-1991

Testing Standard Modell with HIGH PRECISION, not HIGH ENERGY

PSI proton cyclotron, 590 MeV, 2.4 mA current

→ Production of high intensity pion and muon beams

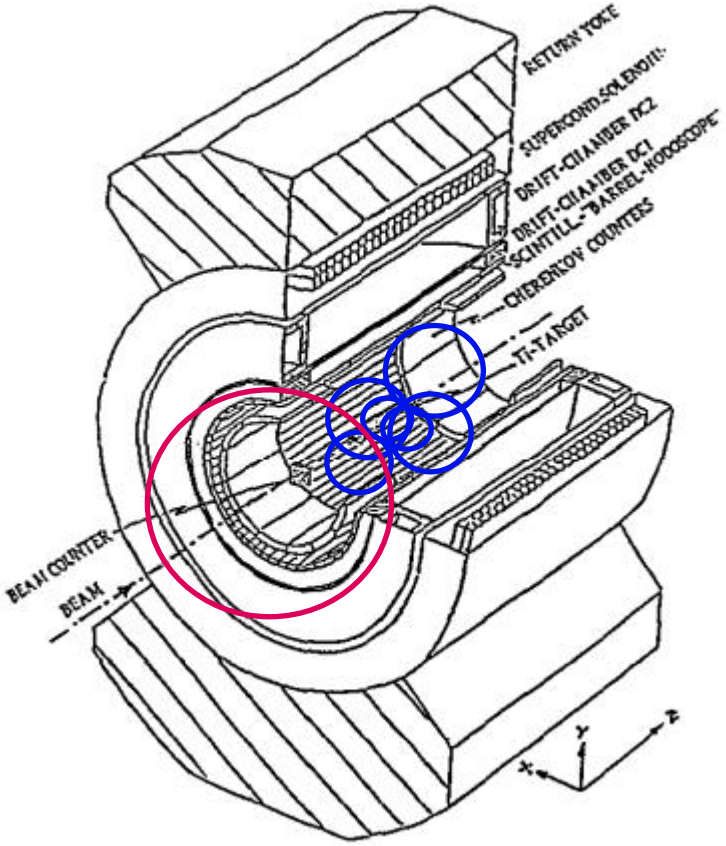
SINDRUM II Experiment at PSI

Normal decay: $\mu^- \rightarrow e^- + \nu_\mu + \bar{\nu}_e$

Forbidden: $\mu^- \rightarrow e^-$ without neutrinos

Mass μ: 105.7 MeV/c^2

Mass e: 0.5 MeV/c^2



SINDRUM II (PSI)

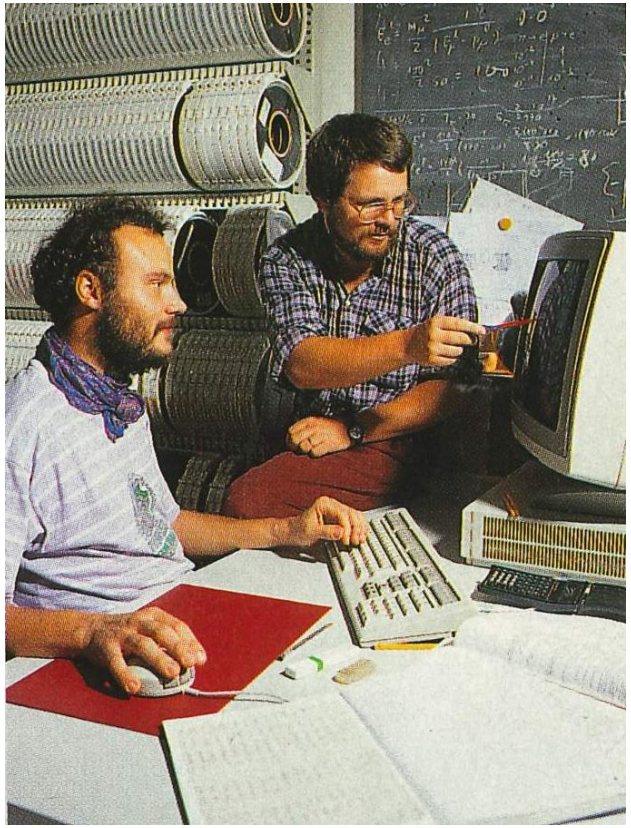
PhD Thesis 1986 - 1990

1986, 1987: shifts taking data for other PhDs

1988: build new detector

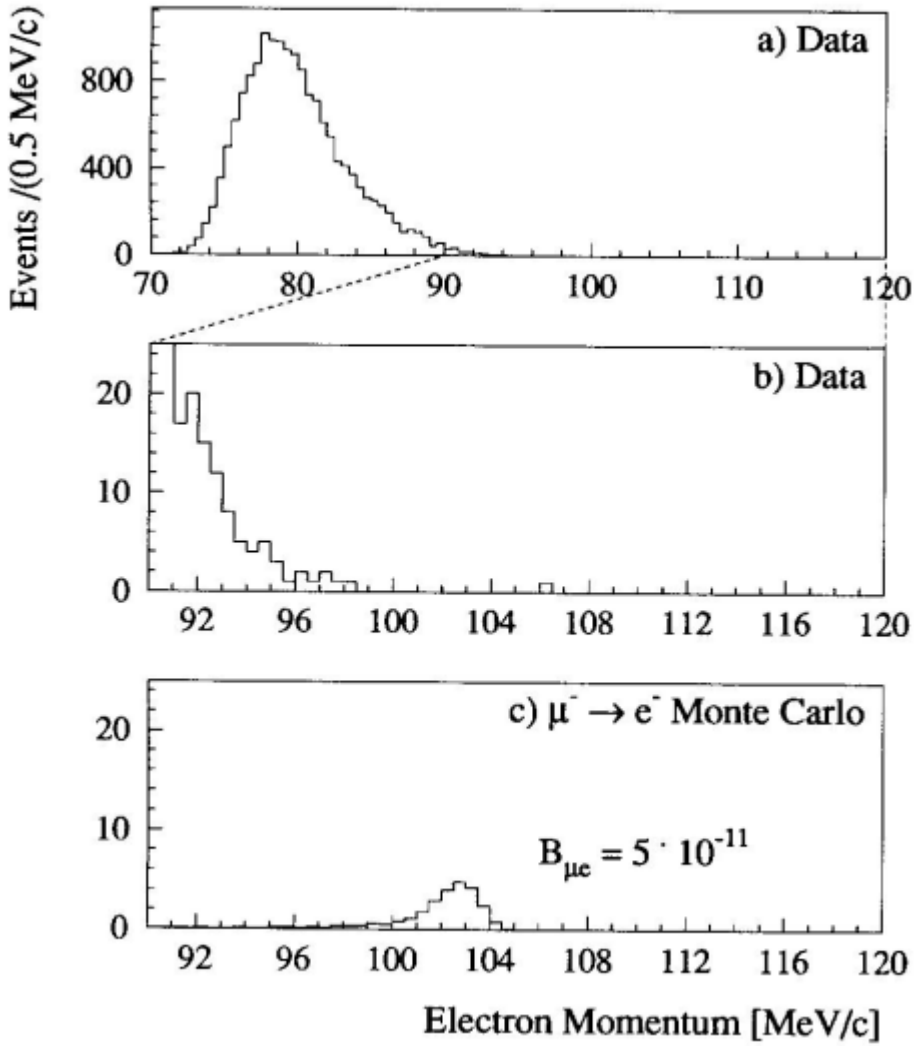
1989: data taking (32 weeks!)

1990: data analysis + writing thesis



Result:

branching ratio $\mu^- \rightarrow e^- < 4 \times 10^{-12}$



IT Department 1991 - 1994

PSI

1991: Join IT department as supporter for experimentalists

1992: change to network group

- Leaving science ecosystem, do more engineering work

1993: E-Mail system for all PSI

- Very interesting: wish for commercial system → negotiations with SW & HW companies
- Project plan, implementation, operations, user support

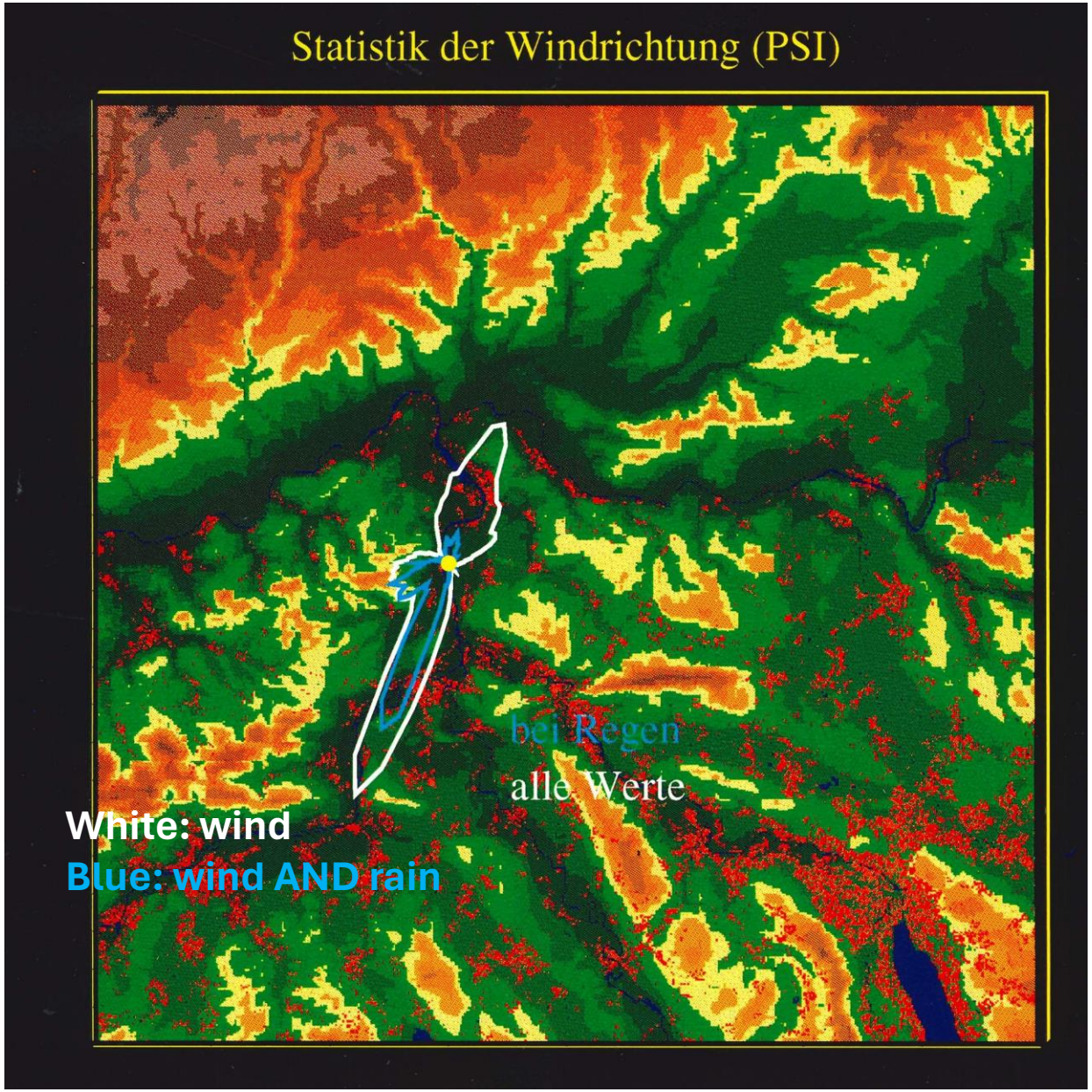
IT Department 1991 - 1994

1994: Smaller project – readout of environmental monitoring station

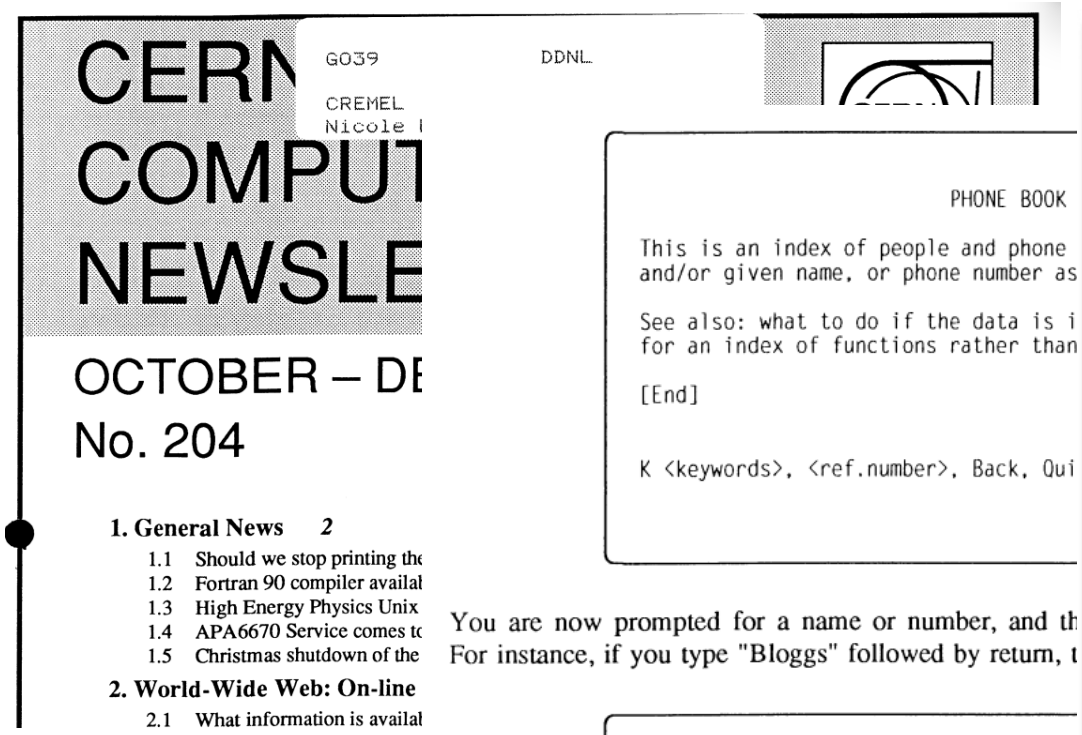
IT Department 1991 - 1994

«do more than what you are asked to do»

Analysis of 10 year weather data

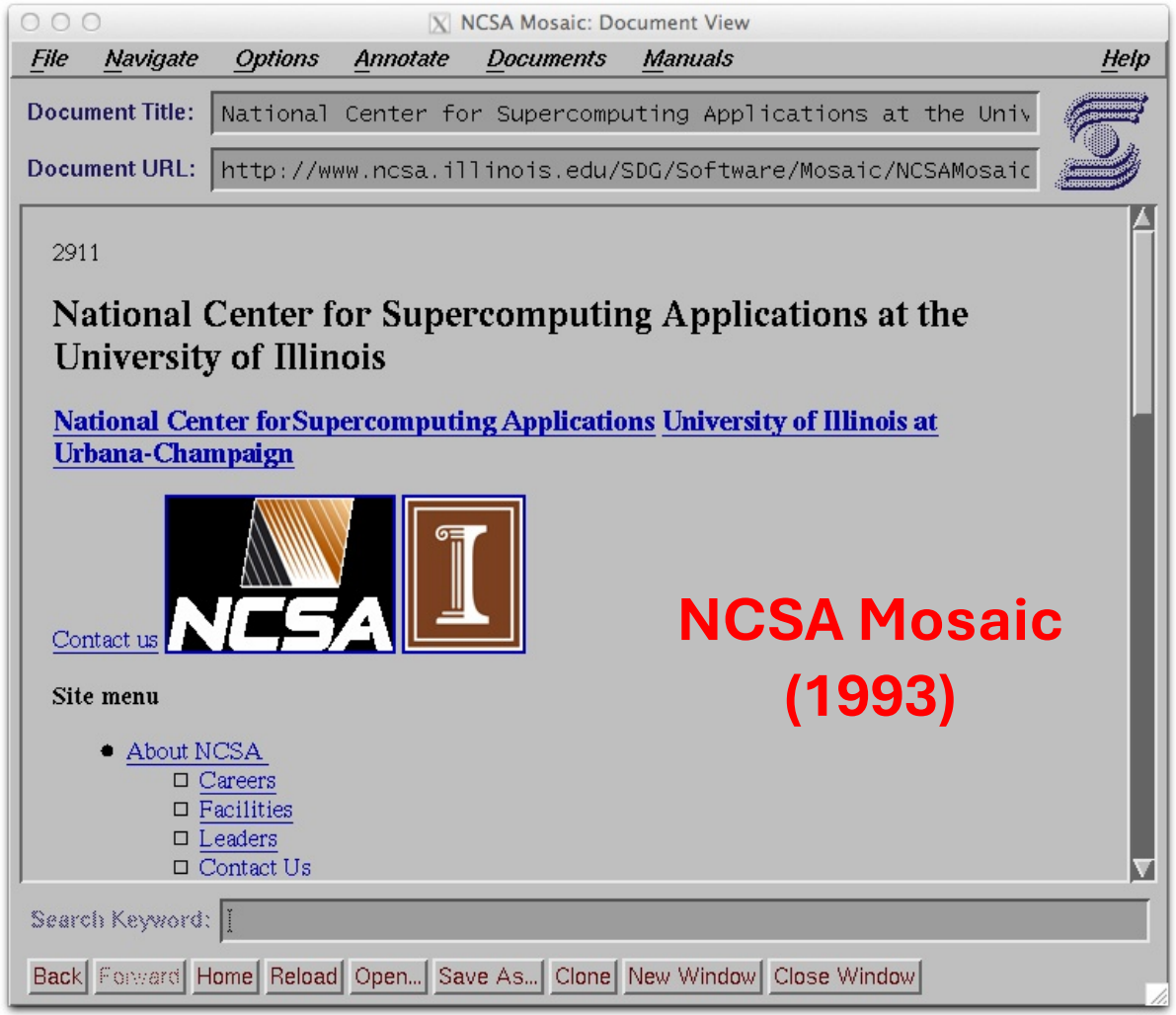


An absurd misjudgement (1991)



2. World-Wide Web: On-line information for everyone

A world of information is now available online from any computer platform. Information sources at CERN and across the world span subjects from poetry to biochemistry and supercomputing. We summarise the information currently sourced at CERN, and we introduce the WorldWideWeb (W3) program which allows you to browse and search all the data in a simple and consistent manner.



NCSA Mosaic (1993)

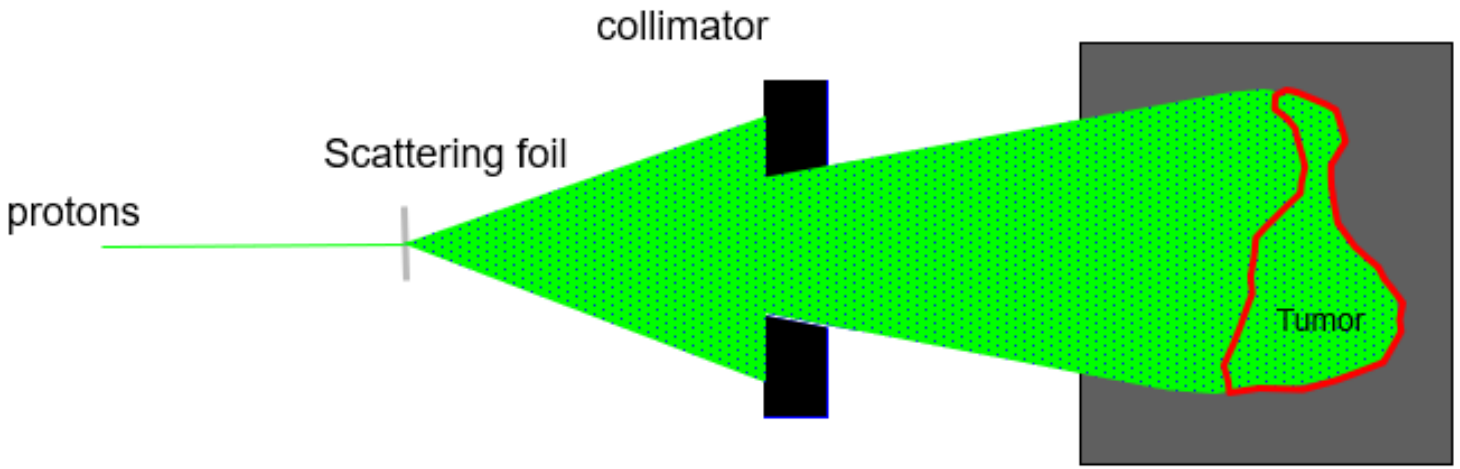
Protontherapy 1995 - 2025

Protontherapy = radiation therapy of cancer with protons

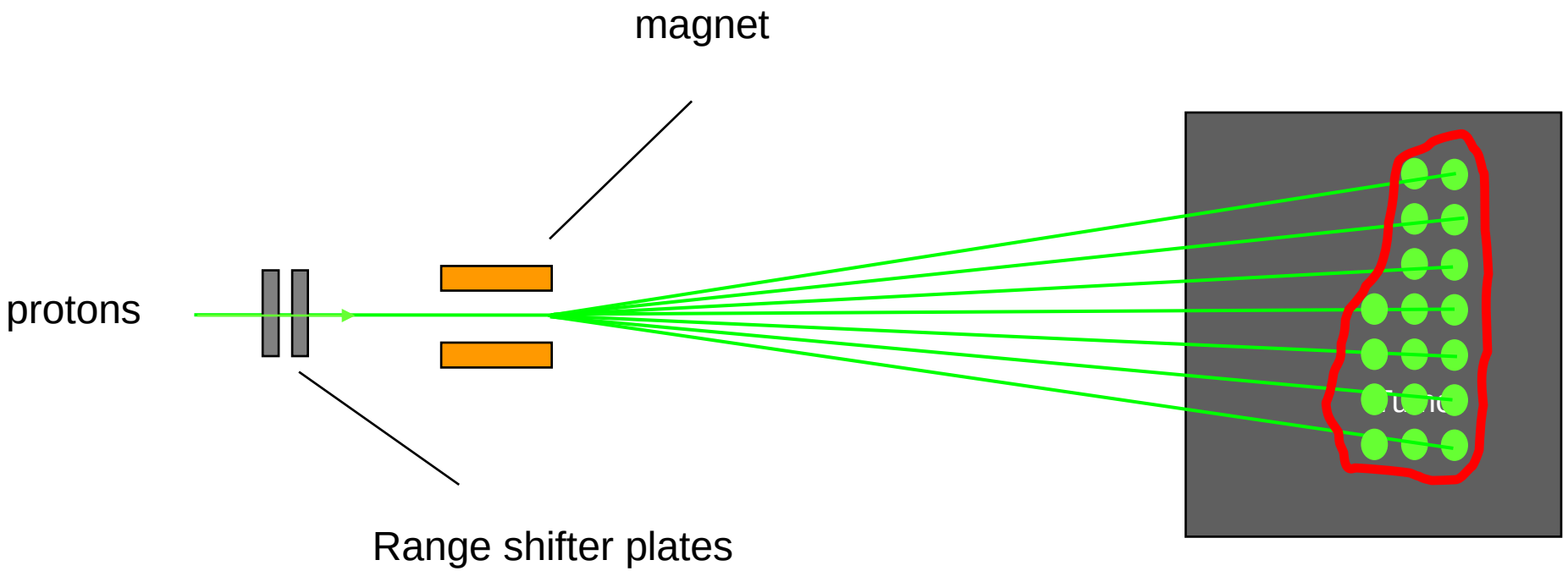
Better geometrical precision than X-rays but more complicated

Task: shape the dose distribution according to the tumour

Conventional method: scatter beam and use collimator



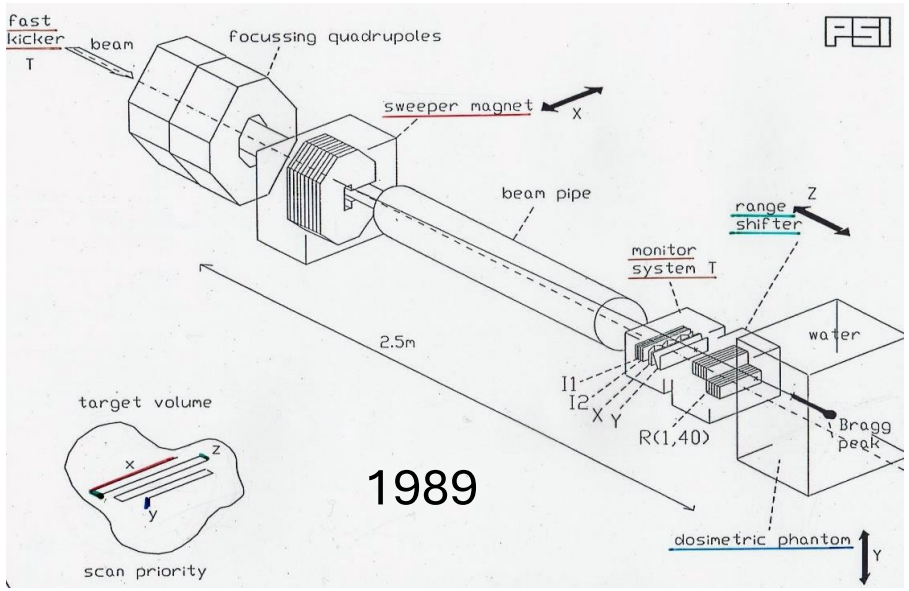
«pencil beam scanning» (PBS)

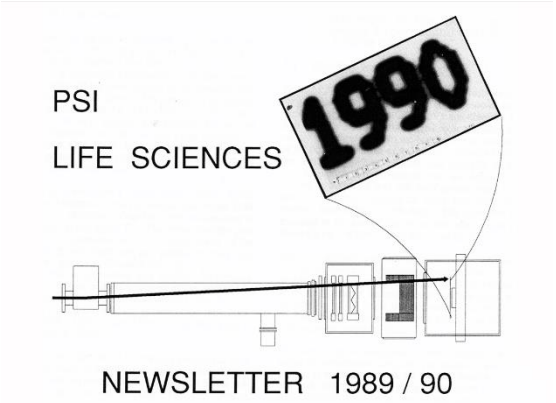


Protontherapy 1995 - 2025

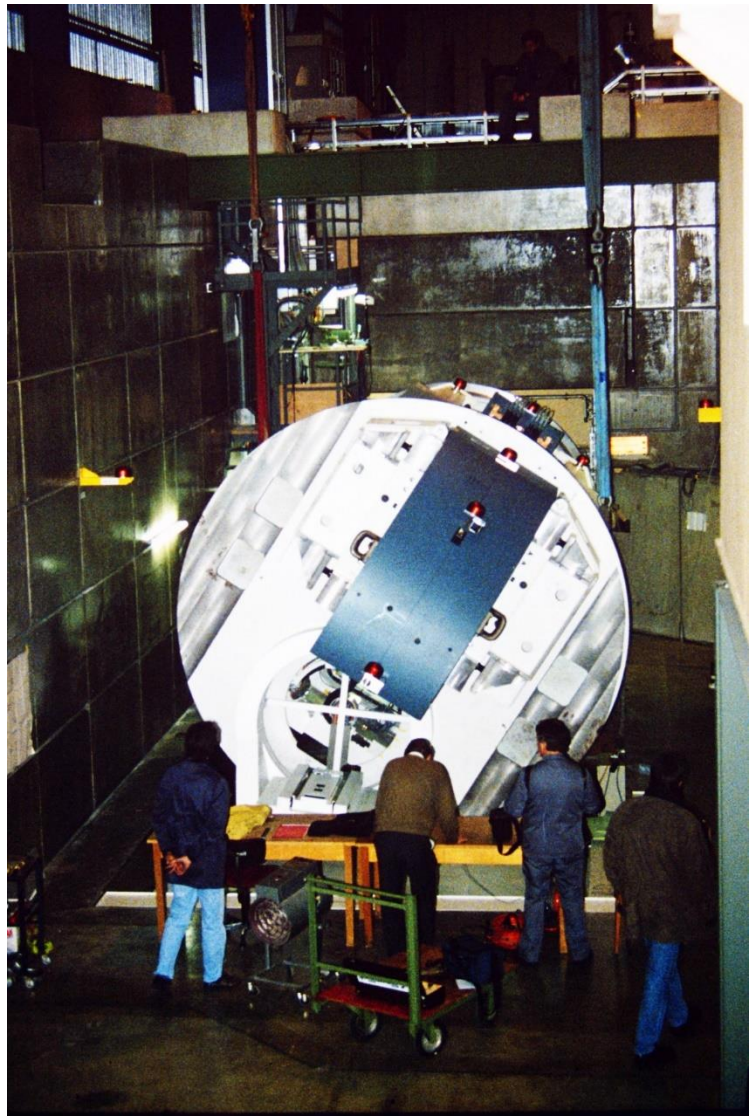
- At PSI a small group (15 people) was working on PBS
- Successful demo experiment in 1989
- Decision to build the world's first clinical PBS unit
- Project plan: start patients in 1996

- 1 person working on control system left in 1994
  → PANIC !!!





1994



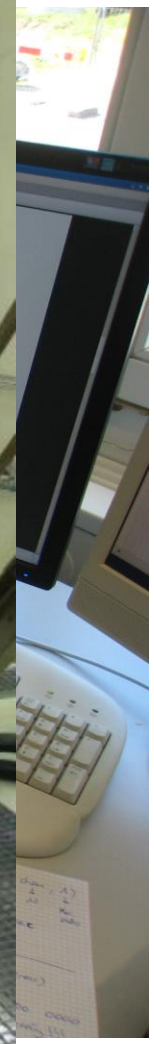
Protontherapy 1995 - 2025

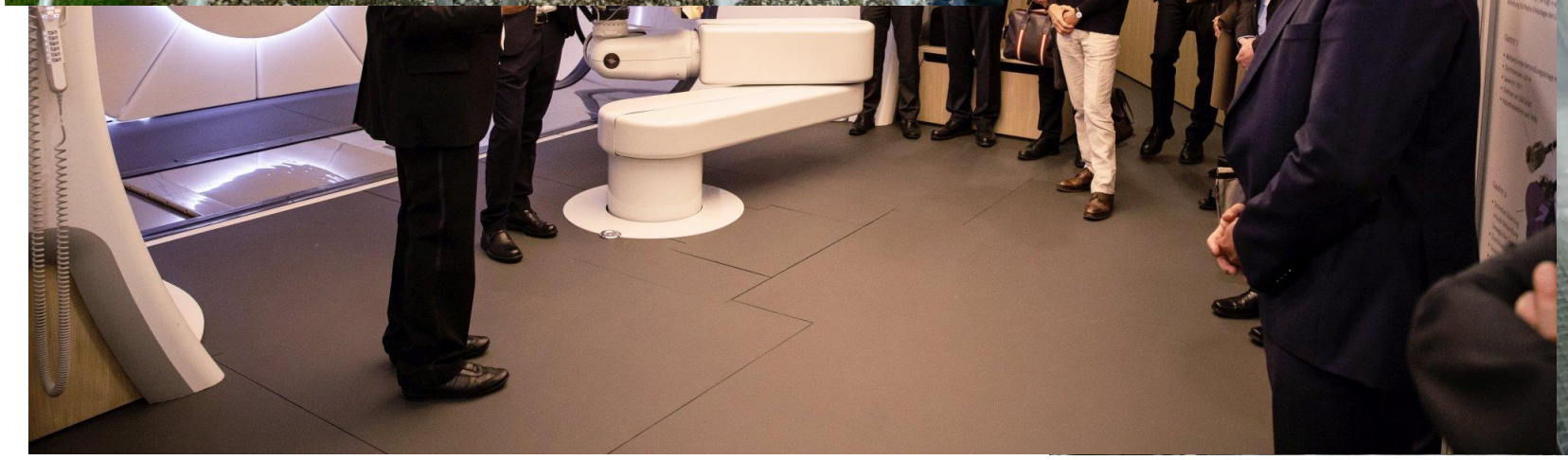
Control System finalized and debugged
First patient treated November 1996

For 12 years the only PBS unit worldwide

Today PBS is standard for protontherapy

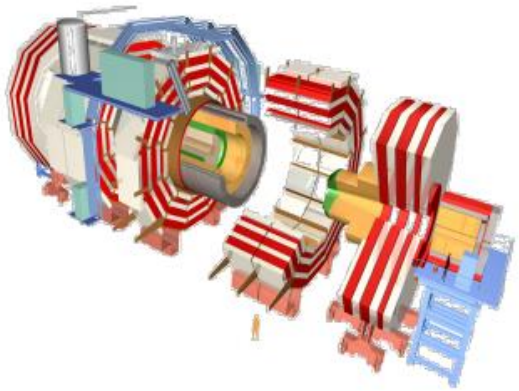
Protontherapy 1995 - 2025

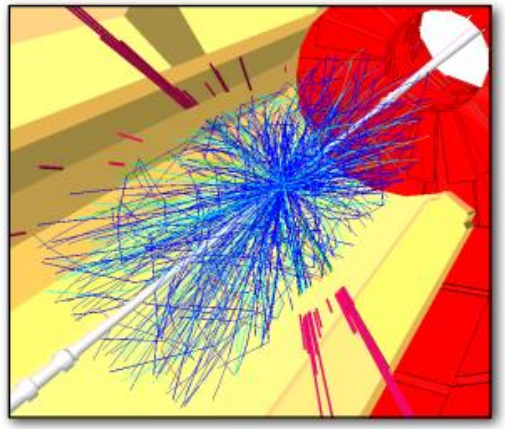


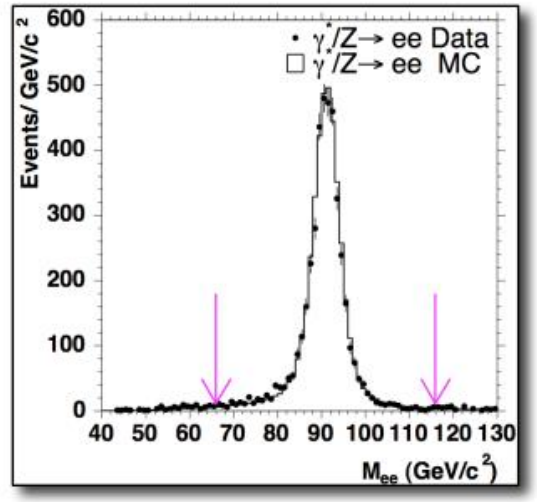


Optimizing PBS using tools from high energy physics

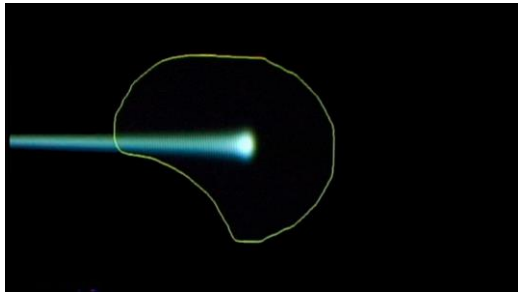
HEP: Detector → Single event → Analysis of many events

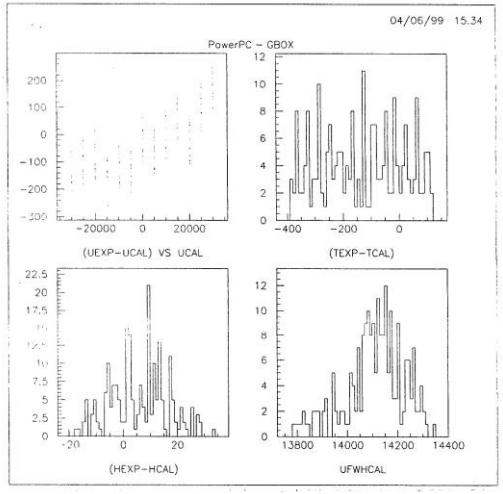






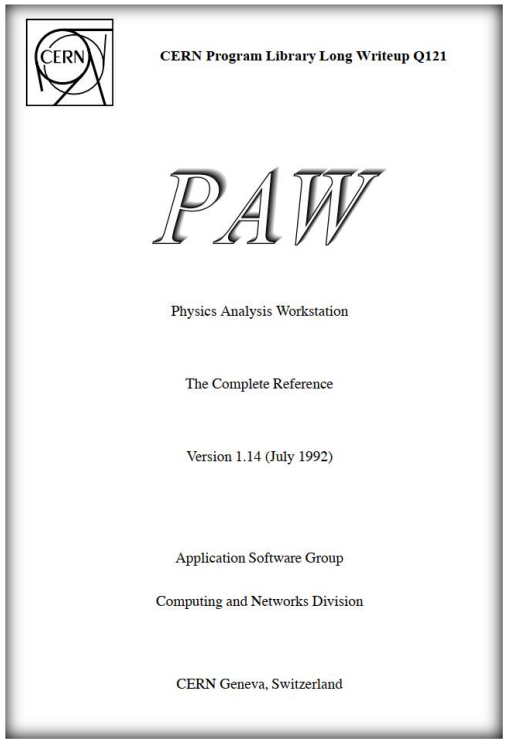
Pencil beam scanning: Gantry → Single spot → Analysis of many spots



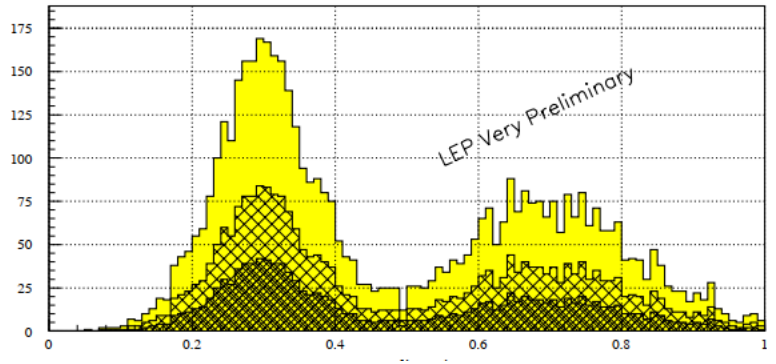


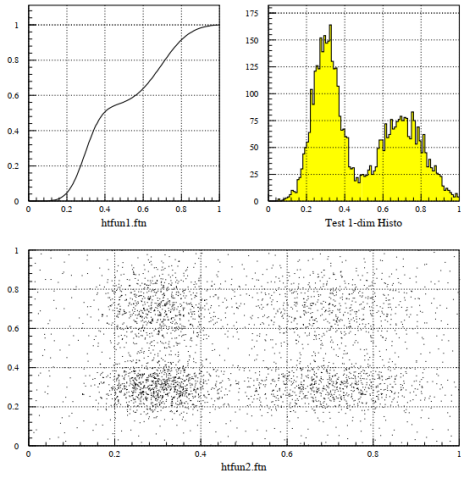
→ Write logfiles with per-spot-data

CERN: HBOOK → PAW → ROOT




```
PAW > NT/SCAN 10 nation=NATFR.and.division=DIVEP ! ! 5 age service children grade step
*****************************************************************************
* ENTRY *   AGE      *   SERVICE   *   CHILDREN  *   GRADE     *   STEP      *
*****************************************************************************
!    48 !   56.000    !   34.000    !  0.00000    !   7.0000    !   8.0000    !
!   194 !   62.000    !   27.000    !  0.00000    !   7.0000    !   13.000    !
!   213 !   56.000    !   26.000    !  0.00000    !   6.0000    !   13.000    !
!   214 !   45.000    !   26.000    !  0.00000    !   6.0000    !   12.000    !
!   216 !   56.000    !   19.000    !  0.00000    !   5.0000    !   13.000    !
!   266 !   63.000    !   26.000    !  0.00000    !   13.000    !   10.000    !
!   267 !   59.000    !   32.000    !  0.00000    !   13.000    !   10.000    !
!   273 !   55.000    !   26.000    !   1.0000    !   12.000    !   13.000    !
!   275 !   53.000    !   26.000    !   1.0000    !   11.000    !   13.000    !
!   279 !   51.000    !   30.000    !  0.00000    !   6.0000    !   13.000    !
!   315 !   56.000    !   25.000    !  0.00000    !   8.0000    !   6.0000    !
```





https://ep-news.web.cern.ch/content/interview-rene-brun

Logging information per spot

```
/***********************************************************

    contents of output buffer:

    index   contents
    0       spotnumber
    1       Preset Monitor 2
    2       delay_to_add for Preset Monitor 2
    3       Monitor1 single gated
    4       Monitor2 single ungated
    5       dose measured by U strip chambers
    6       dose measured by T strip chambers
    7       U center nominal
    8       U center actual
    9       T center nominal (should always be 0)
    10      T center actual
    11      U FWHM nominal
    12      U FWHM actual
    13      T FWHM nominal
    14      T FWHM actual
    15      sweeper hall probe nominal
    16      sweeper hall probe actual
```

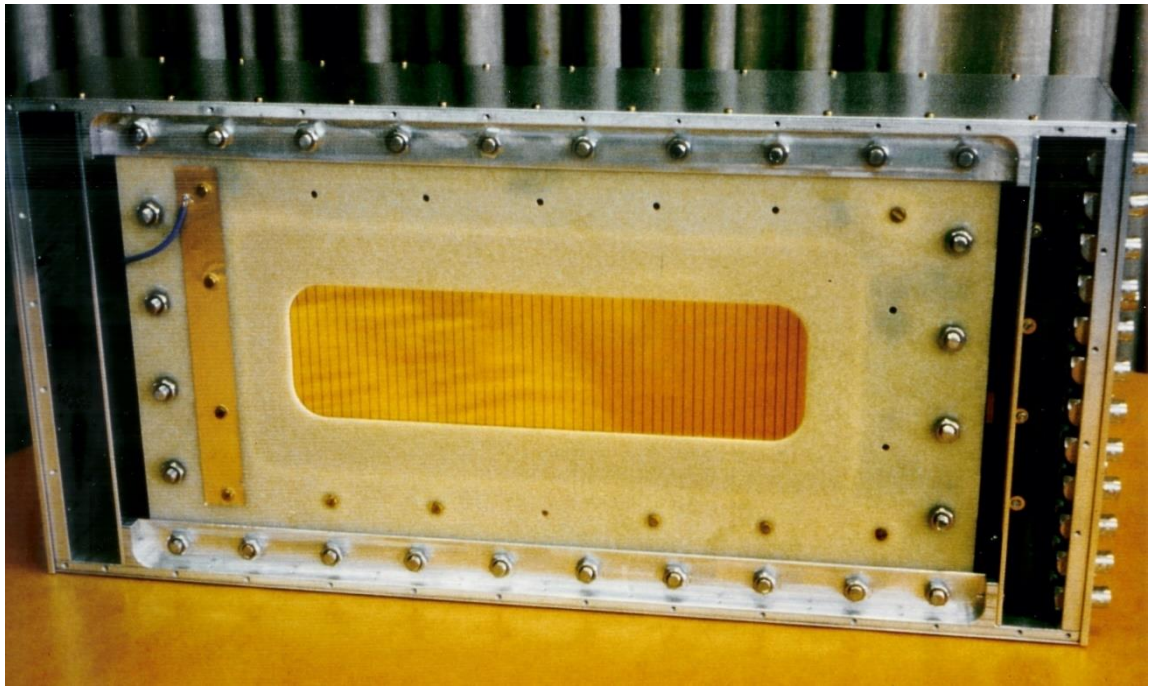
```
/***********************************************************

    contents of output buffer:

    index   contents
    17      gantry position X
    18      gantry position Y
    19      gantry position Z
    20      actual range shifter plate settings plate
01...24
    21      actual range shifter plate settings plate
25...40
    22      10 kHz clock ungated single
    23      10 kHz clock gated single
    24      ADG3 hallprobe nominal value [0.1 mV]
    25      ADG3 hallprobe actual value [0.1 mV]
    26      10 kHz clock summed gated
    27      10 kHz clock summed ungated

            . . .
```

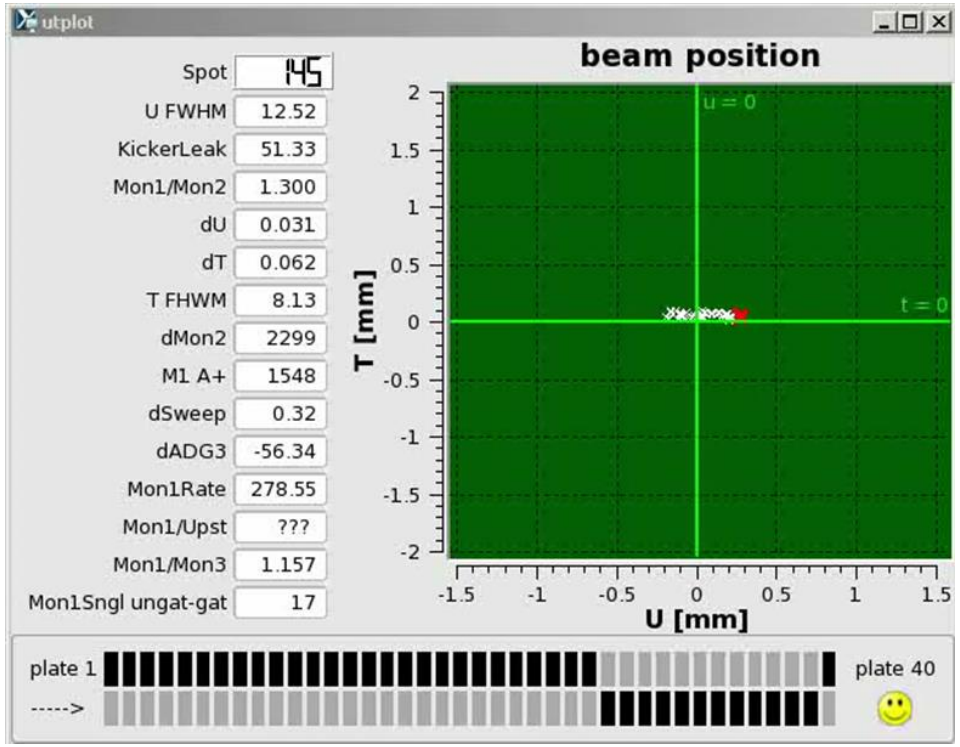
128 parameters per spot

Pencil beam scanning needs to control dose AND position

Position sensitive IC (Kapton foil with 4mm aluminium strips)

Measure beam position and shape



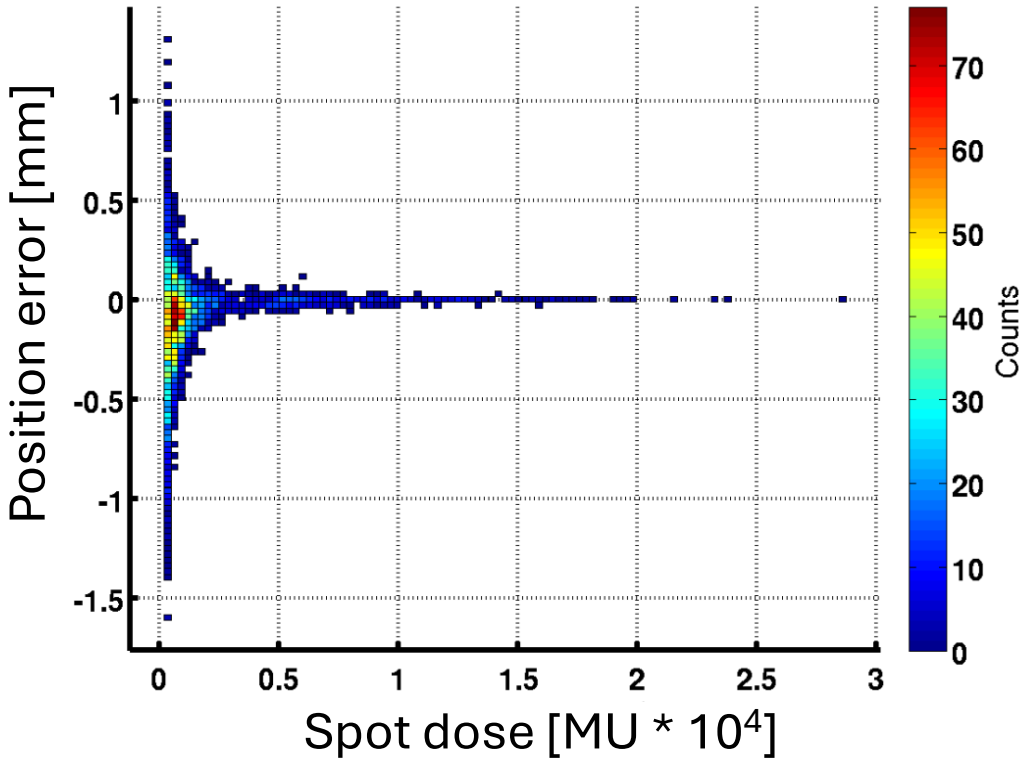


Use HEP tools to analyze proton therapy data

PSI

During commissioning of Gantry 1: interlocks due to spot position error
(difference nominal/actual position out of tolerance)

→ Introduce dose dependent tolerance!



A useful tool for Quality Assurance

Logfiles proved to be a valuable tool for Patient Specific Quality Assurance

- Back calculation of dose and dose distribution from monitor units, table position, beam settings etc. (PhD thesis; now a routine tool)
- Current project: retrospective analysis of PSI Gantry treatments
  - «Modeling of proton RBE variations in patients: Retrospective analysis of 20 years of treatment of chordoma and chondrosarcoma cancer patients”

RBE is hypothesized to be affected by numerous factors, among which dose averaged LET. Other, more "exotic" quantities that have sparked interest in the last years are Dose rates … Thanks to the logfiles we can reconstruct all these quantities and get as close as possible to the actual delivered physics quantities.
We can approximate the dose rate because the timings of the spots were recorded (timestamps and durations)

Bastien Golomer, PSI PhD student

Protontherapy 1995 - 2025

2016 major reorganisation: less operational responsibility, more strategic projects

Example: Protontherapy project in Hefei, China

Chinese very interested in collaboration, but significant opposition at PSI

Solution:

- PSI spin off company designs copies of PSI beamline diagnostics
- Manufacturing by Swiss (and German) companies
- Sell to China ☺

Get experience in technology transfer

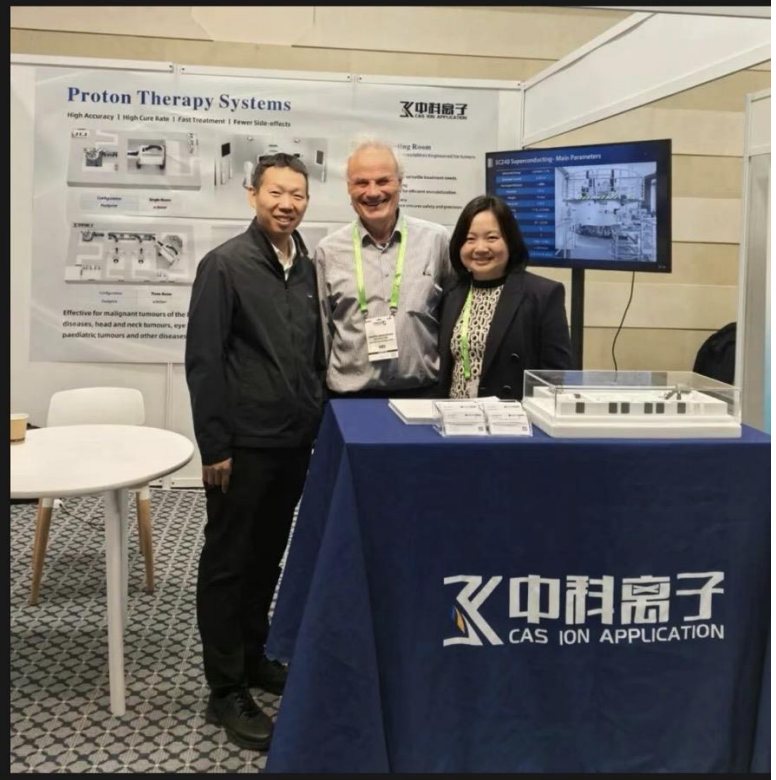
Mediate negotiations between European and Chinese companies

Use my know how and experience in foreign environment

Many interesting trips to China ☺

随后，马丁·格罗斯曼教授（来自瑞士保罗谢勒国家实验室）在会上代表获奖外国专家发言。他表示，非常荣幸获得“合肥友谊奖”，感谢市委市政府领导给予的支持与帮助，同时强调公司项目成功的关键不仅依赖技术合作，更离不开良好沟通和深度信任。合肥市的各项引才举措为外国专家在肥发展开辟了绿色通道，解决了后顾之忧，为外专安心工作、舒心生活、放心发展提供了保障。

作为可完整提供质子治疗系统整机及核心部件的中国企业，中科离子本次展出CAPRO-X1质子放射治疗系统、SC240超导回旋加速器。两款设备的核心性能对标国际主流装备，获得以色列、比利时、美国、日本等多国专家、投资公司和业界同仁的广泛关注。



大会现场

CAPRO系列质子放射治疗系统，采用模块化设计，治疗舱室支持单室、多室多种配置，集


CCTV 1
综合
新闻联播
CCTV
新闻联播
中国IPT

IEEE - NPSS

NPSS Real Time Conference: participant since 1999, organizing committee since 2016

NPSS Leadership (AdCom) since 2017

Enormously expanded my network and impact!

IEEE NPSS Schools

Conclusion

Find out what you want to do

Do more than what you are asked to do

Be open and flexible

Use opportunities

Choose the people you like to work with