100th birthday of Carl Adam Petri

PETRI'S WORK IN HAMBURG

RÜDIGER VALK

UNIVERSITY OF HAMBURG

PETRI NETS 2026

HAMBURG, JUNE 22-26 , 2026

I, too, would like to extend a warm welcome to everyone here today at this celebration.

In my contribution, I would like to highlight the importance

- **of Petri for Hamburg on the one side, but also the importance**
- **of Hamburg for Petri on the other.**

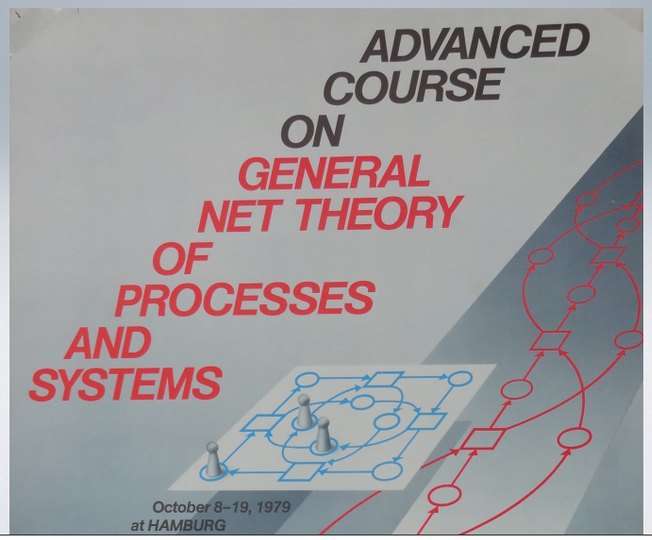


Brauer&Valk

1970/71



1979

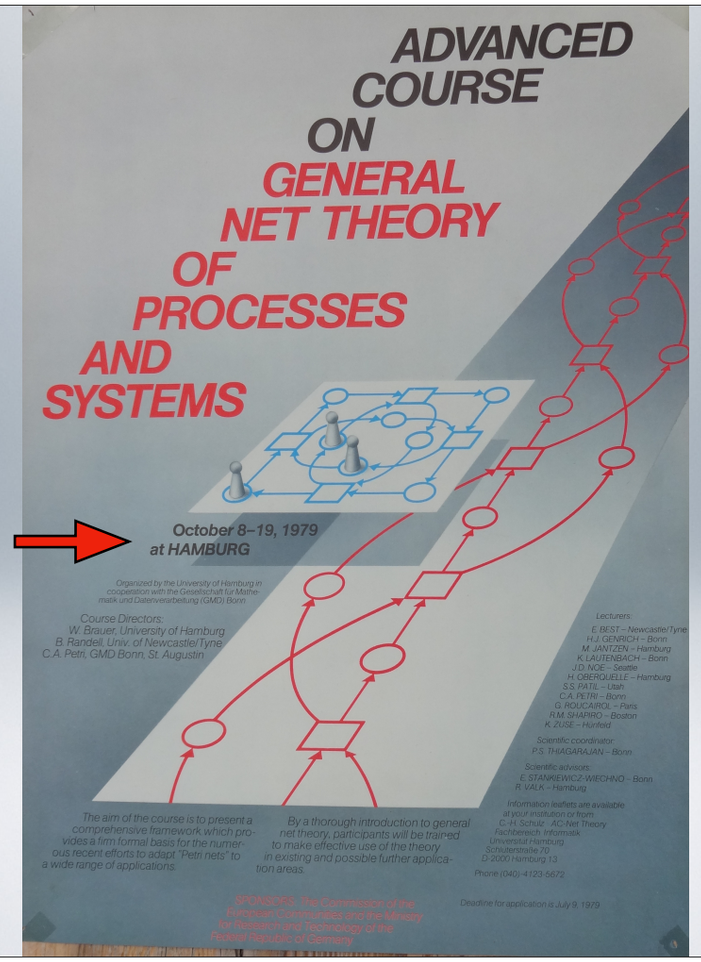


As a student, I was introduced to nets at Petri's institute near Bonn, and then in 1971 I moved to Hamburg with Wilfried Brauer as his diploma student, where he founded the Institute of Informatics.

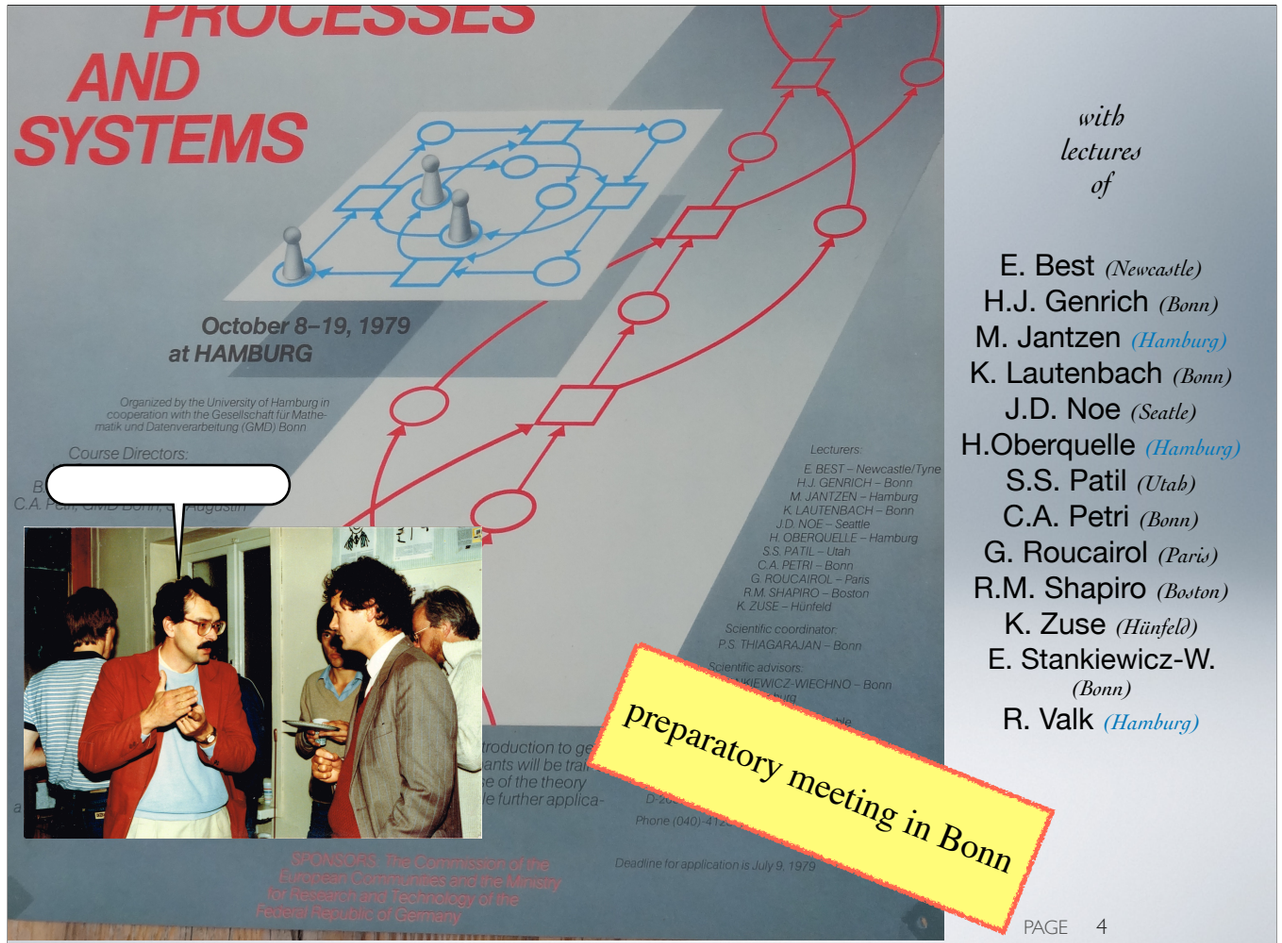
- One of the first major events here in Hamburg was the Advanced Course in 1979 with …

with course directors

W. Brauer
B. Randell
C.A. Petri



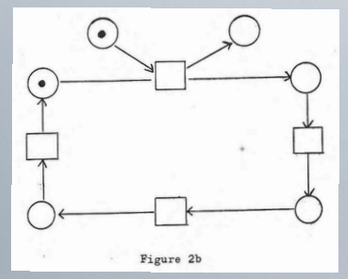
with Brauer, Randell and Petri as directors and



the principal resarchers in the field at that time as lectures together with some Hamburg-based academics which are high-lighted here.

At that time, the lecturers were obliged to coordinate their concepts and definitions. This had already happened at a meeting at the GMD some time before the Advanced Course started.

C.A. Petri, General Net Theory.
Computing System Design:
Proc. of the Joint IBM University of
Newcastle upon Tyne Seminar,
*Sep. **1976**, S. 131–169 (1977)*

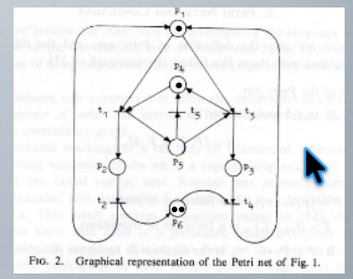


no multiple tokens
not enabled if contact (token on output place)
no side conditions
no token capacities

Elementary Net system
EN-system

Condition/Event Systems
C/E Sytem
(with case graph)

R. Valk and G. Vidal Naquet
Petri Nets and Regular Languages
J. Comp. and Systems Sciences
Vol. 23, (**1981**)

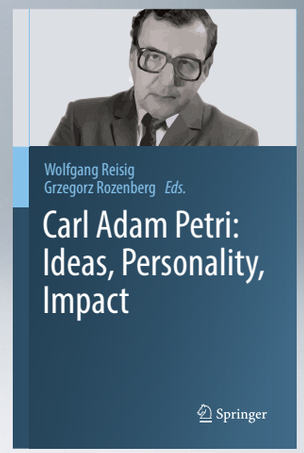


Place/Transition Net
PT-net

There were essentially two different definitions of a net, not only by their graphical representation here from Petri 1977 and from myself 1981, but also with respect to the behavioural semantics.
◉ no multiple tokens were considered, transitions not enabled if contact (token on output place), no side conditions, no token capacities and not these restrictions otherwise.
At a special meeting at Petri's institute the representatives of both worlds (namely the Petri- and the Brauer-Group) were sitting face to face and had intense discussions about the topics to be presented, about the lectures to be held and the definitions to be used. The definitions - wellknown today - where agreed upon.◉ EN-Systems and PT-Systems

On the Two Worlds of Carl Adam Petri's Nets

Rüdiger Valk

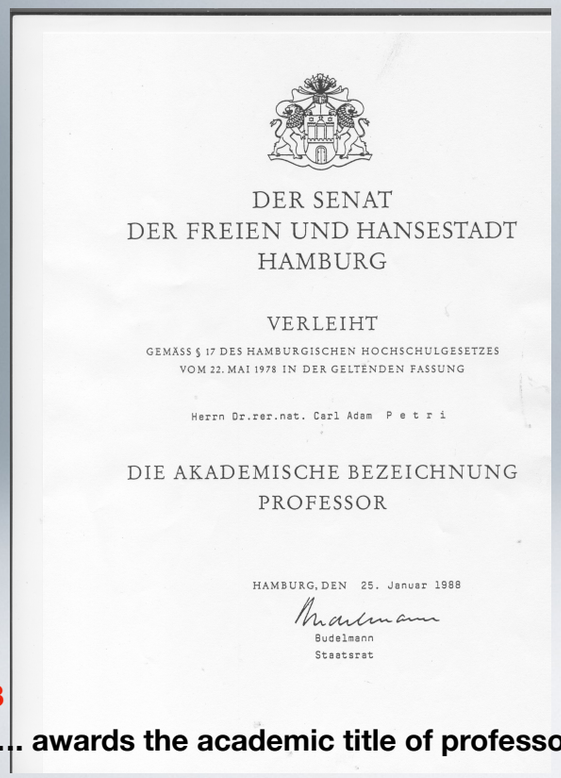


With his work Carl Adam Petri initiated a scientific world that includes by now a huge number of publications. The area covers multiple aspects, but from a historical point of view there have been two main streams or worlds of thinking. This article describes how I experienced both of these worlds of working and thinking in over 40 years of my academic life.

During the last year of my academic studies toward a degree in mathematics in 1971 at the University of Bonn I was employed as a student assistant at a major research institution near Bonn, the *Gesellschaft für Mathematik und Datenverarbeitung* (*GMD*), where Petri was the director of the *Institute for Information Systems*. As a student I saw Petri only from a distance, but I attended the Ph.D. Defense of Hartman Genrich, where he emphasized Petri nets as the description model of the future in contrast to the old-fashioned "steam engine" of automata theory (a field in which I was writing my diploma thesis). This experience motivated me to change my research interests to Petri nets after having finished my Ph.D. thesis on topological automata in 1974 at the University of Hamburg.

Following my education at the University of Bonn (and not at the GMD) my research on Petri nets started in the context of finite automata and formal languages, and my first major publication in this field was on "Regular Petri Net Languages" [22]. Such a publication would not have been possible within Petri's research group. Petri always emphasized the point that modeling should be in direct accordance with physical laws and real-world observations. As a consequence, for example, multiple tokens were not used, and side conditions or token capacities for example

This can be read in my article 'On the two worlds …' in the book *Carl Adam Petri: Ideas, Personality, Impact*.



DER SENAT
DER FREIEN UND HANSESTADT
HAMBURG

VERLEIHT

GEMÄSS § 17 DES HAMBURGISCHEN HOCHSCHULGESETZES
VOM 22. MAI 1978 IN DER GELTENDEN FASSUNG

Herrn Dr.rer.nat. Carl Adam P e t r i

DIE AKADEMISCHE BEZEICHNUNG
PROFESSOR

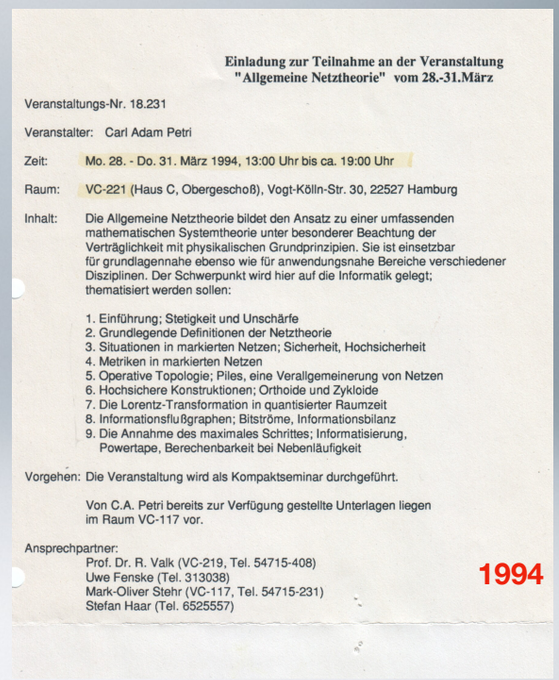
HAMBURG, DEN 25. Januar 1988

Budelmann
Staatsrat

1988

…. awards the academic title of professor

lecture on “General Net Theory”



Einladung zur Teilnahme an der Veranstaltung
"Allgemeine Netztheorie" vom 28.-31.März

Veranstaltungs-Nr. 18.231

Veranstalter: Carl Adam Petri

Zeit: Mo. 28. - Do. 31. März 1994, 13:00 Uhr bis ca. 19:00 Uhr

Raum: VC-221 (Haus C, Obergeschoß), Vogt-Kölln-Str. 30, 22527 Hamburg

Inhalt: Die Allgemeine Netztheorie bildet den Ansatz zu einer umfassenden mathematischen Systemtheorie unter besonderer Beachtung der Verträglichkeit mit physikalischen Grundprinzipien. Sie ist einsetzbar für grundlagennahe ebenso wie für anwendungsnahe Bereiche verschiedener Disziplinen. Der Schwerpunkt wird hier auf die Informatik gelegt; thematisiert werden sollen:

1. Einführung; Stetigkeit und Unschärfe
2. Grundlegende Definitionen der Netztheorie
3. Situationen in markierten Netzen; Sicherheit, Hochsicherheit
4. Metriken in markierten Netzen
5. Operative Topologie; Piles, eine Verallgemeinerung von Netzen
6. Hochsichere Konstruktionen; Orthoide und Zykloide
7. Die Lorentz-Transformation in quantisierter Raumzeit
8. Informationsflußgraphen; Bitströme, Informationsbilanz
9. Die Annahme des maximales Schrittes; Informatisierung, Powertape, Berechenbarkeit bei Nebenläufigkeit

Vorgehen: Die Veranstaltung wird als Kompaktseminar durchgeführt.

Von C.A. Petri bereits zur Verfügung gestellte Unterlagen liegen im Raum VC-117 vor.

Ansprechpartner:
Prof. Dr. R. Valk (VC-219, Tel. 54715-408)
Uwe Fenske (Tel. 313038)
Mark-Oliver Stehr (VC-117, Tel. 54715-231)
Stefan Haar (Tel. 6525557)

1994

Then, as the responsable professor, in 1988 I organized for Petri the **award of a professor** at our university.

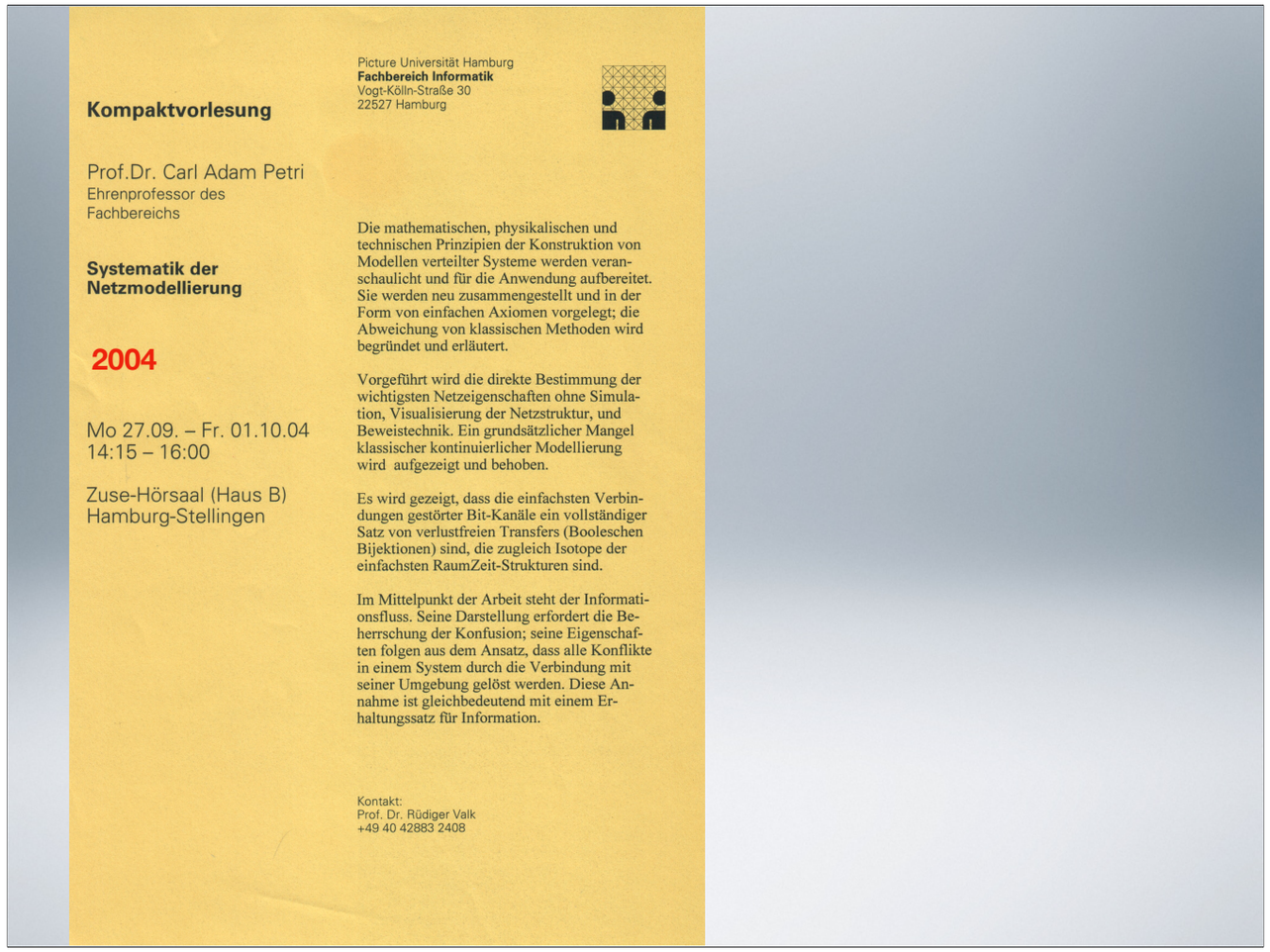
- This marked the beginning of personal relationships and a long series of seminars and lectures that Petri gave here.



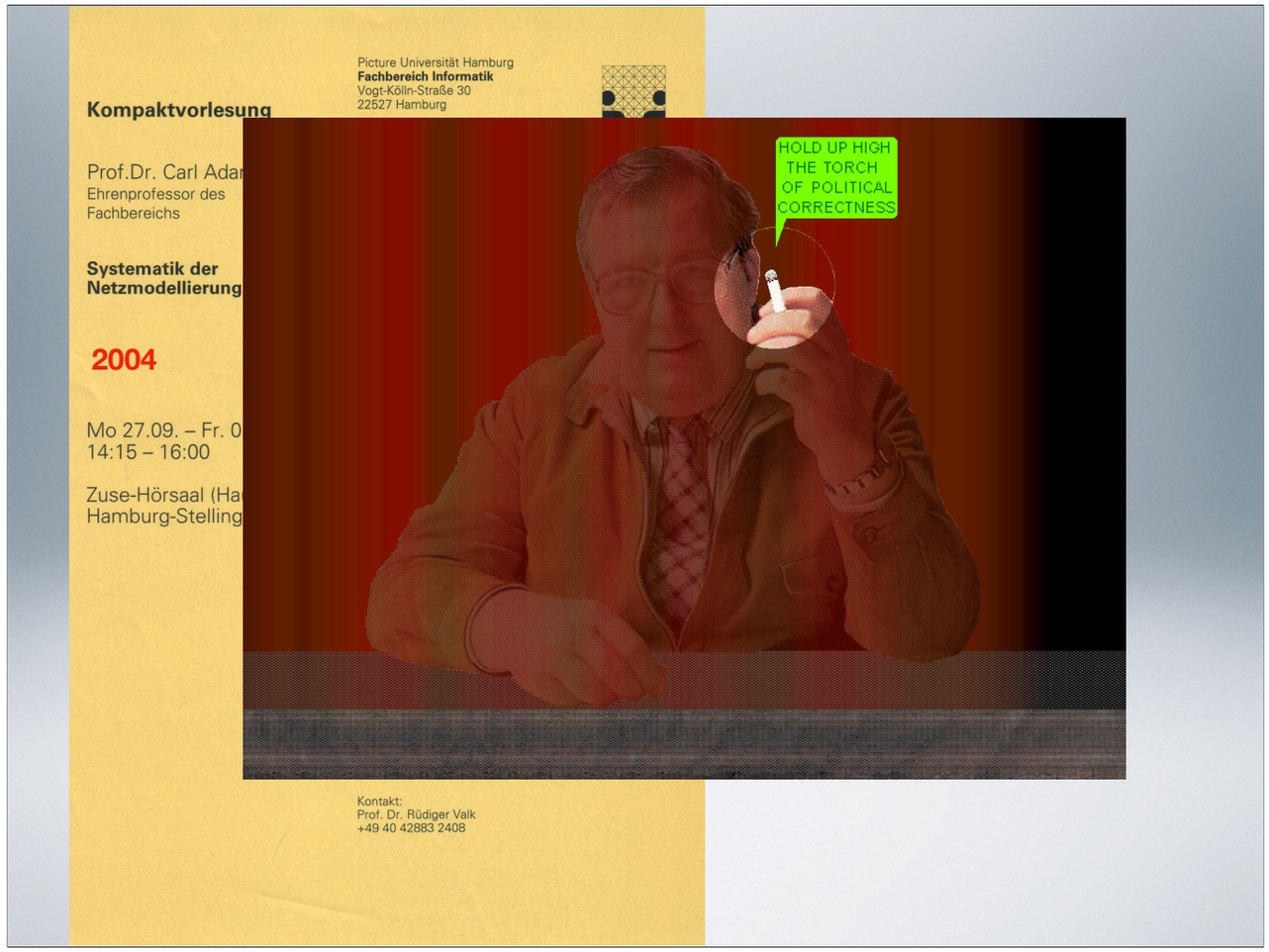




Here is Petri giving a talk, ◉ with a slide on cycloids ◉ and his audience, most of them beeing students - at that time.



As a consequence, for many years Petri regularly gave lectures and guided seminars on topics of his choice. Notorious were the long sessions until late at night with discussions on the topics of the day's lecture given by Carl Adam, ignoring lunch and dinner breaks in a room full of smoke ◉ (picture, designed by Carl Adam himself).



PAUSE (picture, designed by Carl Adam himself). Look how much effort Petri has put into depicting the smoke! For the Ideas-Book I had to remove it, as the editor wanted to have a better outfit of the picture!



He loved these meetings with students very much as he didn’t have that kind of environment for discussions at the GMD institute. ◉ I think some of these persons are present.

Causality, Concurrency and Conflict in Elementary Net Systems

Petri's Axioms of Concurrency
A Selection of Recent Results

Olaf Kummer Mark-Oliver Stehr
Universität Hamburg, Fachbereich Informatik
Vogt-Kölln-Straße 30, D-22527 Hamburg
{kummer, stehr}@informatik.uni-hamburg.de

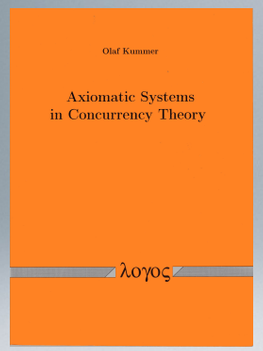
Petri nets 1997, Toulouse

Petris Zykloide und Überlegungen zur Verallgemeinerung

Diplomarbeit

Uwe Fenske





Diploma Thesis

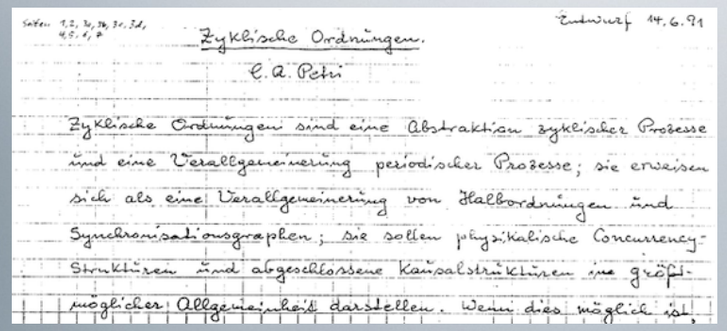
Valk R. Formal Properties of Petri's Cycloid Systems. *Fundamenta Informaticae*, 2019. **169**:85–121. doi:10.3233/FI-2019-1840.

R. Valk, D. Moldt / On Reduction and Synthesis of Petri's Cycloids

to appear in *Fundamenta Informaticae* 2026
https://doi.org/10.48550/arXiv.2405.21025

- These discussions have given rise to a number of papers in Concurrency Theory:
- by Stephan Haar, Olaf Kummer and Marc-Oliver Stehr.
  - The latter, together with Uwe Fenske's thesis, formed the basis of my work on cycloids.

I noted only journal contributions in **Fundamenta Informaticae**



Zyklische Ordnungen.

Entwurf 14.6.91

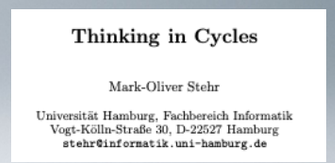
C.A. Petri

Zyklische Ordnungen sind eine Abstraktion zyklischer Prozesse und eine Verallgemeinerung periodischer Prozesse; sie erweisen sich als eine Verallgemeinerung von Halbordnungen und Synchronisationsgraphen; sie sollen physikalische Concurrency-Strukturen und abgeschlossene Kausalstrukturen in größtmöglicher Allgemeinheit darstellen. Wenn dies möglich ist,

A manuscript by Petri,

with documentation by Uwe Fenske

This 10-page manuscript by Carl Adam Petri, *Cyclic Orders*, was made available to the participants of a 'special seminar' on the same subject (students from the General Net Theory research group in the Department of Informatics) on the morning of the celebratory colloquium at the University of Hamburg on 17 June 1991, marking the author's 65th birthday.



Thinking in Cycles

Mark-Oliver Stehr

Universität Hamburg, Fachbereich Informatik
Vogt-Kölln-Straße 30, D-22527 Hamburg
stehr@informatik.uni-hamburg.de

1 Introduction

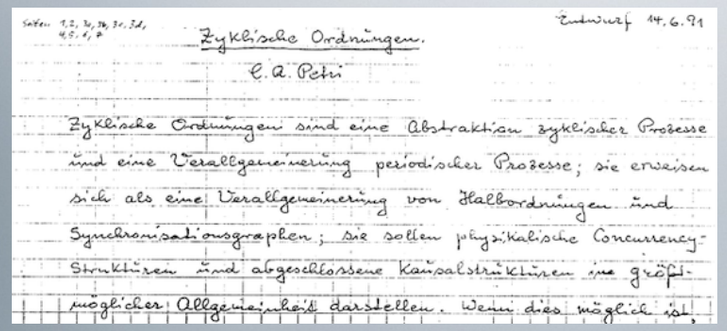
Petri nets 1998, Lisbon

It was in 1991 on the occasion of the Hamburg colloquium devoted to C.A.Petri's 65th birthday when the author was confronted with the apparently contradictory idea of a cyclic order for the first time. In a meeting with a group of students (the author was among them) C.A.Petri discussed a draft [11] where he proposed new axioms for cyclic orders. The approach to cyclic orders presented here is different[1] but in the spirit of the original ideas [13].

A manuscript by Petri, with documentation by Uwe Fenske, who did much for the documentation of Petri's work here in Hamburg.

◉Marc-Oliver Stehr's resulting work on **cyclic orders** from the Lisbon Petri net conference, where he explicitely refers to these meetings.

These results are – in my opinion – given far too little attention!



Zyklische Ordnungen.

Entwurf 14.6.91

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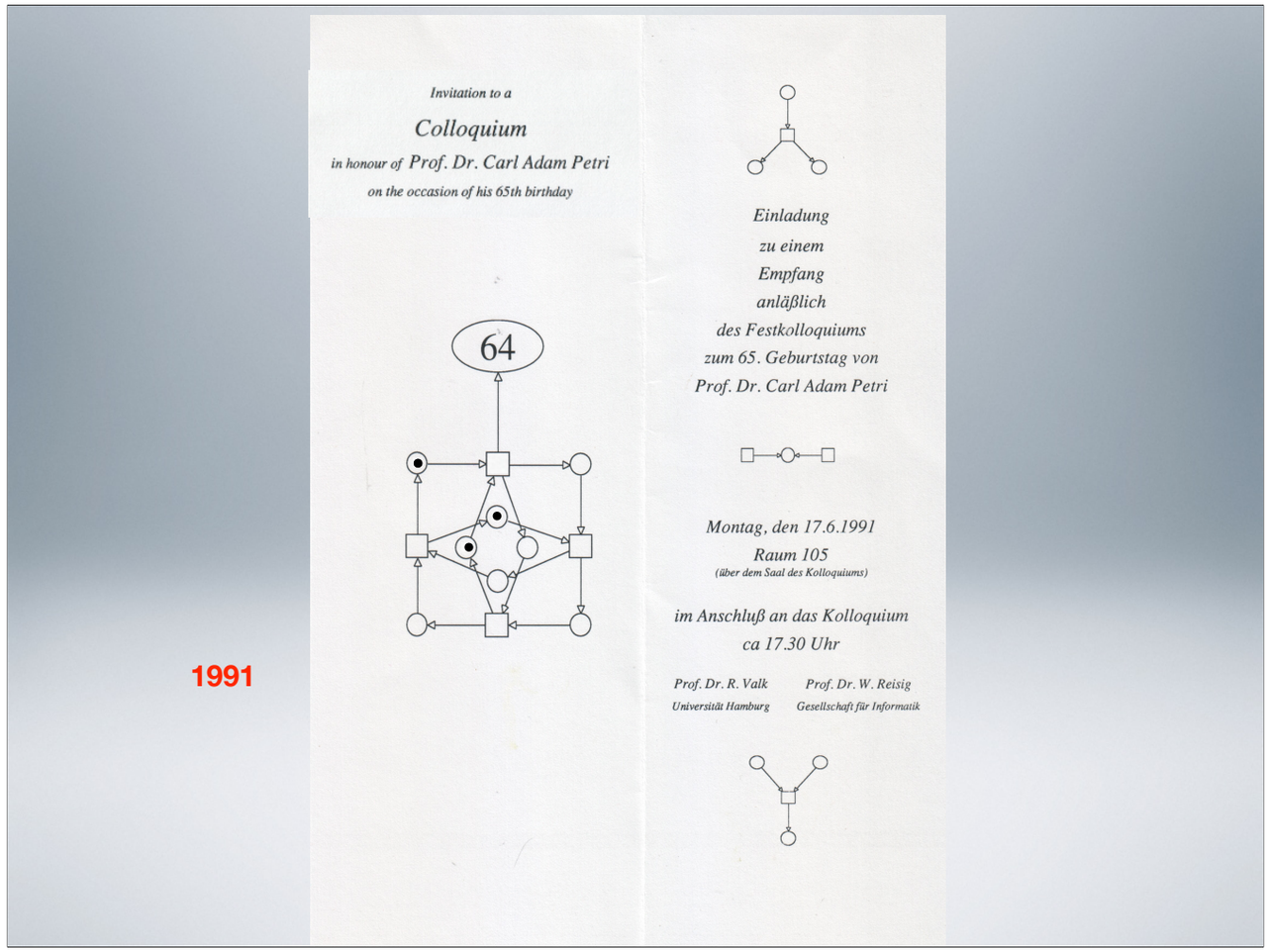
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According to Uwe Fenske's documentation, Petri presented his theory of cyclic orders on the day of the celebrations marking his 65th birthday.

1991



Invitation to a

Colloquium

in honour of *Prof. Dr. Carl Adam Petri*

on the occasion of his 65th birthday

64

Einladung
zu einem
Empfang
anläßlich
des Festkolloquiums
zum 65. Geburtstag von
Prof. Dr. Carl Adam Petri

Montag, den 17.6.1991
Raum 105
(über dem Saal des Kolloquiums)

im Anschluß an das Kolloquium
ca 17.30 Uhr

Prof. Dr. R. Valk
Universität Hamburg

Prof. Dr. W. Reisig
Gesellschaft für Informatik

◉ **The invitation is adorned with the ‘Four Seasons Net’, which marks the event of Carl Adams 65th birthday.**

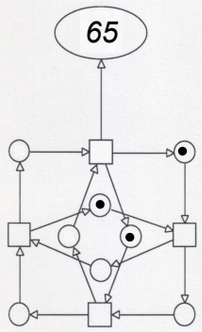
1991

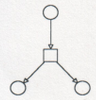
Invitation to a

Colloquium

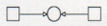
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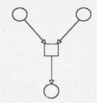


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Eröffnung/Introduction

Prof. Dr. Rüdiger Valk
Fachbereich Informatik

Prof. Dr. Klaus Lagemann
Sprecher des Fachbereichs Informatik

***

Glückwünsche/Congratulations

Prof. Dr. Barbara Vogel
Vizepräsidentin der Universität Hamburg

Prof. Dr. Wilfried Brauer
Technische Universität München

Prof. Dr. Ing. Hermann Flessner
Fachbereich Informatik

***

Kolloquium/Colloquium

Prof. Dr. Robin Milner
University of Edinburgh

Automata, Algebra and Concurrency

Pause/Break

Prof. Dr. Wolfgang Reisig
Technische Universität München

Petri Nets: Fundamentals, Essentials, Consequences

Prof. Dr. Eckehard Schnieder
Technische Universität Braunschweig

Which Theory Matches Embedded Systems — Petri Nets as a Formal Basis

***

Calculus of Communicating Systems (CCS)



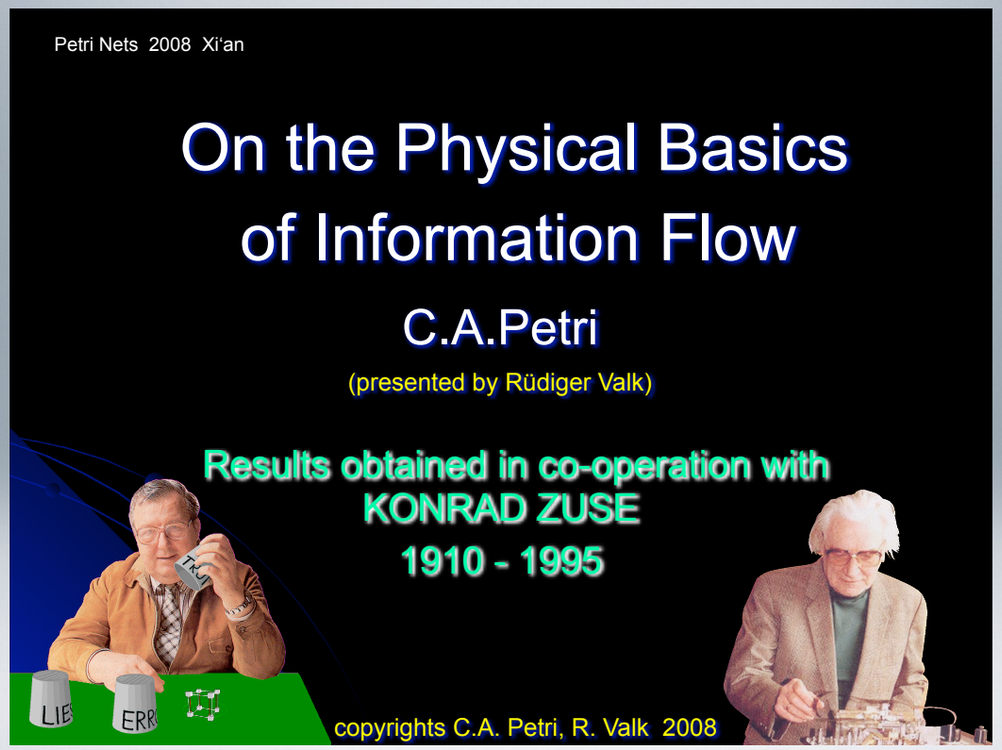
π-calculus

bigraphs,
a formalism for
ubiquitous computing

1991

In addition to Wolfgang Reisig and Eckehard Schnieder, we had invited ◉ Robin Milner as a special guest speaker.

2008



Before the Petri net conference in Xian, China **in 2008**, in a letter Carl Adam wrote: "I would enjoy very much to fly to China, in particular with you as chairman. However, my
age as well as my health do not allow it. But I still think about producing a PPT presentation which you can present." ◉ For a whole year nearly

every day I had e-mail exchanges with him to discuss things that were not clear to me. Carl Adam appreciated this procedure since it gave him the opportunity to discuss his ideas, to remove errors, and to find new representations.

These slides can be found on the web side

https://cycloids.de/

Thank you for your attention !

RÜDIGER VALK

UNIVERSITY OF HAMBURG

PN 2026

HAMBURG