

## 6

# Publikationen der Innsbrucker Plasmaphysiker

## 6.1 Publikationen der Innsbrucker Plasmaphysiker in begutachteten Fachzeitschriften seit 1958

**Zusammenstellung:** R. Schrittwieser, A. Kendl

### 1960

- F. Cap, E. Hofinger, "Über einige Klassen von stationären zweidimensionalen Lösungen der Magnetogasdynamik", *Acta Physica Austriaca* **13** (1960), 262-264.

### 1963

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- F. Cap, "Legendre transformation and characteristics of the magnetogasdynamic potential equation", *Journal of Nuclear Energy C* **7** (1965), 69-77.
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## 1969

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- F. Cap, H. Falser, "Effects of high electrical conductivity in two-dimensional plasma flows", *Journal of Applied Mathematics and Physics (ZAMP)* **20** (1969), 947-956.
- D. Floriani, "General algorithm for the investigation of plasma instabilities." *Nuclear Fusion* **9** (1969) 77-79.
- H. Friedel, "Nonideal magnetogasdynamic flows in boundary-layer approximation." *Z. Angew. Math. Phys.* **20** (1969) 329-342.
- J.W. Weil, "A note on reduced probability distribution functions" *Nuclear Fusion* **9** (1969) 171.

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- Z. Vörös, T.L. Zhang, M.P. Leubner, M. Volwerk, M. Delva, W. Baumjohann, K. Kudela, "Magnetic fluctuations and turbulence in the Venus magnetosheath and wake", *Geophysical Research Letters* **35** (2008) L11102.
- P.C. de Vries, E. Joffrin, N.C. Hawkes et al., "Effect of toroidal field ripple on the formation of internal transport barriers." *Plasma Phys. Control. Fusion* **50** (2008) 065008.

## Weitere Publikationen

In den frühen Jahren zwischen 1950 und 1970 wurden an der Universität Innsbruck viele Forschungsarbeiten der Physik in Form von unveröffentlichten internen Berichten ("Reports") dokumentiert. Diese sind heute leider zum Teil nicht mehr archiviert und vergriffen.

Ein Überblick über alle Forschungsdokumente aus dieser Zeit ist erhalten durch den Report "*17 Years Plasma Physics in Innsbruck*", by Ferdinand Cap, UNICP Scientific Report No. 100, 15. September 1973, Institute for Theoretical Physics, Innsbruck University.

Dieser historisch interessante Bericht ist in Kapitel 7 original reproduziert.

Begutachtete Publikationen und alle Dissertationen aus dem der Plasmaphysik nahe stehenden und in einem gemeinsamen Forschungsschwerpunkt verbundenen Bereich der Ionenphysik an der Universität Innsbruck sind zusammengestellt in der Festschrift "40 Jahre Institut für Ionenphysik und Angewandte Physik", A. Bacher und T.D. Märk (Hg.), Innsbruck University Press 2007.

Das vorliegende Buch zu "50 Jahre Plasmaphysik und Fusionsforschung in Innsbruck" ist in elektronischer Form mit farbigen Abbildungen unter [www.plasmaphysik.at](http://www.plasmaphysik.at) zu finden.

Die Anfangsjahre der Plasmaphysik in Innsbruck wurden sogar in einem "heiteren Schlüsselroman" (Zitat: Prof. Hannspeter Winter 2004 in seiner Laudatio zum Festkolloquium anlässlich des 80. Geburtstags von Prof. Ferdinand Cap) von Dr. Jürgen Weil frei verarbeitet. Darin über das Fusionsplasma:

*"... die Schwierigkeit, dieses instabile, launenhafte, weibische Ding beisammenzuhalten, diesen Sack voll Flöhe zur höchsten Potenz - diese Schwierigkeit war zur Zeit, als Fridolin in Arnsbrück begann, schon bekannt und ist, obwohl man schon viel weitergekommen ist, auch heute noch im wesentlichen ungelöst.... damals konnte man freilich noch hoffen, durch irgendeinen isolierten Geniestreich, durch eine Mischung von Glück und Geist, das Problem ein für alle Mal zu erledigen, etwas, worüber man heutzutage, nachdem man unendlich viel mehr weiss und tausende Holzwege und Sackgassen in alle Richtungen abgeschritten ist, nur lachen kann, so wie ein Molekularbiologe unserer Tage über die Krestheorien des Mittelalters lachen mag."*

Jürgen W. Weil: Fridolin und die Bombe, oder wie der Astronphysiker Orel lernte, das Leben zu lieben. Roman (Gebundene Ausgabe). Edition Atelier, Wien, 1987 (vergriffen)

## 6.2 Bücher

Alexander Kendl, Sabine Schindler (Hg.):

**Introduction to Computer Science and Applied Computing.**

*Innsbruck University Press, 2008. ISBN 978-3-902571-45-8.*

Ferdinand Cap: **Wie wird man 130 Jahre alt? Der Mensch als**

**Wesen der Natur.** *Verlag Böhlau, 2008. ISBN: 978-3205782025.*



Alexander Kendl: **Plasma Turbulence in complex magnetic field structures**

*Innsbruck University Press, 2007. ISBN978-3-902571-17-5.*

A. Bacher, T.D. Märk (Hg.): **40 Jahre Institut für Ionenphysik und Angewandte Physik**

*Innsbruck University Press, 2007. ISBN: 978-3-902571-30-4.*

Ferdinand Cap: **Tsunamis and Hurricans: A mathematical approach**

*Springer, 2006. ISBN 3-211-33158-1.*

Ferdinand Cap: **Glaube und Religion aus der Sicht eines Naturwissenschaftlers**

*Lit Verlag, 2006. ISBN-13: 978-3825895273*

N. Kaiser, H.K. Pulker (Hg.): **Optical Interference Coatings**

*Springer, Berlin, 2003. ISBN: 978-3540003649.*

Ferdinand Cap: **Mathematical Methods in Physics and Engineering with Mathematica**

*CRC Press, 2003. ISBN: 1584884029.*

Ferdinand Cap: **Ein Ende der Religionen?**

*Studien Verlag, Innsbruck, 2003. ISBN: 3706518813.*

A.A. Harms, K.F. Schöpf, D.R. Kingdon, G.H. Miley: **Principles of Fusion Energy:**

**An Introduction to Fusion Energy for Students of Science and Engineering**

*World Scientific Publishing, 2000. ISBN: 9810243359.*

Hans Binder, Heinrich Bodner, Ferdinand Cap (Hg.):

**Macht und Ohnmacht des Aberglaubens. Magie - Wissenschaft - Pseudowissenschaft**

*Hohe Warte, 1992. ISBN: 3882023430*

Hans K. Pulker: **Coatings on Glass**

*Elsevier, Amsterdam, 1984; 2nd Re. Ed., Elsevier, Amsterdam, 1999. ISBN: 0-444-50103-7*

Ferdinand Cap: **Wie löst man Randwertprobleme in Physik und Technik**  
*Gruyter. 1998. ISBN:3110129981*

S. Kuhn and T.D. Rognlien (Hg.):  
**Proceedings of the Edge Plasma Theory and Simulation Workshop 1998.**  
 Czechoslovak Journal of Physics, Institute of Physics Acad. Sci. CR 1999.

Ferdinand Cap:  
**Lehrbuch der Plasmaphysik und Magnetohydrodynamik.**  
*Springer, Wien. 1994. ISBN: 3211825703*

Siegbert Kuhn, Klaus Schöpf, Roman Schrittwieser (Hg.):  
**Current Research on Fusion, Laboratory and Astrophysical Plasmas.**  
*World Scientific 1993, ISBN:9810214332.*

Roman Schrittwieser (Hg.): **Fourth Symposium on Double Layers  
 and Other Nonlinear Potential Structures in Plasmas.**  
*World Scientific Publishing Co Pte Ltd. 1993. ISBN-13: 978-9810214326.*

Roman Schrittwieser (Hg.): **Current Driven Electrostatic Ion Cyclotron Instability:  
 Proceedings of the Workshop on the Current Driven Electrostatic Ion Cyclotron.**  
*World Scientific Publishing Co Pte Ltd. 1988. ISBN-13: 978-9971506148.*

Arthur March, Ferdinand Cap: **Die physikalische Erkenntnis und ihre Grenzen**  
*Vieweg, Wiesbaden. 1985. ISBN: 3528071087.*

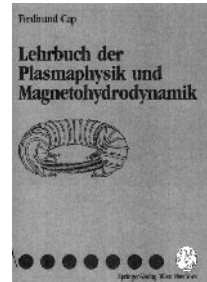
Ferdinand Cap: **Handbook on Plasma Instabilities (Vols. I, II, III)**  
*Academic Press. 1976 / 1978 / 1982*

Ferdinand Cap, Klaus Schöpf: **Energieversorgung**  
*Teubner, Stuttgart. 1981. ISBN: 3519032104*

Ferdinand Cap: **Einführung in die Plasmaphysik (Vols. I, II, III)**  
*Vieweg, Wiesbaden. 1972. ISBN: 3528068035*

Ferdinand Cap: **Physik griffbereit. Definitionen - Gesetze - Theorien.**  
*Akademie Verlag, Berlin. 1972.*

Ferdinand Cap: **Physik und Technik der Atomreaktoren**  
*Springer, Wien. 1957. ISBN: 3211804374*



## 6.3 Dissertationen 1958-2008 in Innsbruck in Plasmaphysik und Fusionsforschung

**Zusammenstellung:** A. Kendl.

**Quelle:** Österreichische Nationalbibliothek (Online-Katalog [www.onb.ac.at](http://www.onb.ac.at))

- 1960 E. Hofinger: Ueber stationaere Potentialstroemungen in der Hydromagnetik
- 1961 R. Hommel: Der Crocco'sche Wirbelsatz in der Magnetogasdynamik
- 1961 G. Kerer: Die eindimensionale-quasistationäre Lösung der magnetohydrodynamischen Grundgleichungen fuer endliche elektrische Leitfähigkeit.
- 1962 H. Pulker: Untersuchung der optischen Eigenschaften von SiO-Aufdampfschichten und von verschieden stark oxydierten Siliziumschichten zwischen Si und SiO<sub>2</sub>.
- 1964 I.W. Steinacker: Ableitung der eindimensionalen instationären magnetohydrodynamischen Plasmagleichungen unter Berücksichtigung von Reibung, Wärmeleitung und Leitfähigkeit und ihre Behandlung nach der Methode der Ähnlichkeits-transformation von K. Bechert.
- 1965 R. Skarics: Die Verwendung von Methoden der Gasdynamik fuer die Konstruktion von magnetogasdynamischen Strömungsbildern.
- 1965 F. Laußermair: Eine iterative Methode zur Behandlung der energieabhängigen Transportgleichung.
- 1966 H. Friedel: Lösung der magnetogasdynamischen Grundgleichungen für ein Plasma beliebiger magnetischer Reynoldszahl.
- 1966 F. Herrnegger: Herleitung des Variationsproblems der eindimensionalen instationären idealen transversalen magnetogasdynamischen Strömungen und dessen Lösung mit Hilfe der Ritz-Methode.
- 1966 K. Welzl-Müller: Über die Verwendung von Variationsverfahren in der Magnetogasdynamik.
- 1966 K. Lackner: Zweidimensionale magnetogasdynamische Strömungen kleiner magnetischer Reynoldszahl.
- 1967 H.G. Falser: Untersuchung von ebenen Plasmaströmungen hoher elektrischer Leitfähigkeit im Rahmen der linearisierten Magnetogasdynamik.
- 1968 H. Bresgen: Zweidimensionale Untersuchungen von MHD-Generatoren unter Berücksichtigung des Halleffektes und Ionenschlupfes.

- 1969 D. Floriani: Anwendung von Ähnlichkeitstransformationen auf Kanalströmungen der Magnetogasdynamik.
- 1970 R. Glätzle: Herstellung plasmagespritzter Wolframschichten, ihre Eigenschaften mit und ohne thermische Nachbehandlung.
- 1970 E.H. Jager: Untersuchungen über das Stabilitätsverhalten dissipativer Plasmaströmungen.
- 1970 F. Lintner: Lösung der partiellen Integrodifferentialgleichung von Boltzmann mit Hilfe der Legendre-Polynome.
- 1971 G. Auer: Driftwellen in einem Plasma mit Dichtegradienten.
- 1971 N. Klaus: Über die Verwendbarkeit einer Duoplasmatronionenquelle bei einem elektromagnetischen Massentrenner.
- 1972 W. Lindinger: Massenspektrometrische Untersuchungen am Plasma des negativen Glimmlichtes einer zylindrischen Hohlkathode.
- 1972 S. Kuhn: Eine numerische Methode zur Untersuchung hochfrequenter Mikroinstabilitäten in beliebigen Fusionsplasmen.
- 1972 P. Fritzer: Simultane numerische Berechnung zweidimensionaler MHD-Strömungen.
- 1972 W. Lindinger: Massenspektrometrische Untersuchungen am Plasma des negativen Glimmlichtes einer zylindrischen Hohlkathode.
- 1972 F.W. Wörndle: Berechnung des Elektronentemperaturanstieges und der Ionisationsrelaxation im Einlaufbereich eines Nichtgleichgewichts-MHD-Generators unter Berücks. von Ionisations- und Anregungsmechanismen einschließlich Atom-Atom-Stößen.
- 1973 F.J. Sellmeier: Parametrische Stabilisierung und Erregung eines gedämpften Pendels großer Amplitude als Modell für ein parametrisch erregtes Plasma.
- 1973 H. Helm: Experimentelle und theoretische Untersuchungen im Fallraum und an der Kathode einer zylindrischen Hohlkathodenglimmladung.
- 1973 J. Schmid: Ebene nichtlineare Wellen in einem warmen, schwach dissipativen Plasma.
- 1973 W. Stemberger: Über die Neukonstruktion der Innsbrucker Q-Maschine und die Bestimmung ihrer Ladungsträgerverluste.
- 1974 N. Schwaighofer: Experimentelle Untersuchungen von Temperatur und Energie der Plasmakomponenten in der neu aufgebauten Innsbrucker Q-Maschine.
- 1975 M. Leubner: Die irdische Magnetopause unter Berücksichtigung einer Winkelverteilung der solaren Teilchen und des interplanetaren Magnetfeldes.

- 1975 F. Handle: Untersuchung der Reaktionskinetik im Plasma des negativen Glimmlichtes einer zylindrischen Hohlkathode mit Hilfe eines Massenspektrometers.
- 1976 C. Leubner: Intensitätsabhängige Korrekturen zum Thomson-Streuquerschnitt und Folgerungen für die Plasmadiagnostik.
- 1976 K. Hirsch: Ausbreitungseigenschaften stationärer Elektronenplasmawellen in Abhängigkeit von ihrer Amplitude.
- 1977 H. Störi: Untersuchungen über den Zünd- und Aufbaumechanismus der zylindrischen Hohlkathodenentladung.
- 1977 R. Ramberger: Optimierung des Stromlinienverlaufes in MHD-Generatoren mit Hilfe variabler Elektrodenleitfähigkeit.
- 1977 F.P. Stössel: MHD-Modelle der Magnetopause mit Winkelverteilung der einfallenden Teilchen für den geneigten Dipol und mit Tail-Feld.
- 1977 P. Holzmann: Experimentelle Untersuchung der schnellen Elektronen aus einer stationären zylindrischen Hohlkathodenentladung in Argon.
- 1979 V. Gieseke: Untersuchung differentieller Energieverteilungen von positiven Ionen aus dem negativen Glimmlicht einer zylindrischen Hohlkathodenentladung.
- 1979 G. Ritter: Entwicklung und Erprobung eines doppelfokussierenden, statischen, axialsymmetrischen Massenspektrometers.
- 1979 M. Grössl: Raumbefestigte Abklingplasmen in hochreinem Argon und Krypton: Aufbau einer Apparatur und Untersuchung der Elementarprozesse atomarer und molekularer Edelgasionen.
- 1979 I. Kuen: Untersuchungen zur Kinetik positiver und negativer Ionen in einer stationären Hohlkathodenentladung.
- 1980 M. Langenwaller: Massenspektrometrische Diagnostik raumbefestigter abklingender Plasmen in Helium, Argon und Krypton.
- 1980 S. Zygelman: Trapped-particle Instability in a toroidal confinement system with a ripple magnetic field.
- 1980 J. Edenstrasser: Untersuchung der bei der Beschreibung symmetrischer MHD-Gleichgewichte auftretenden Willkürlichkeit zweier Flußfunktionen.
- 1980 G. Strasser: Brennstoffdynamik eines hybriden Fusions-Fissionsbrüters.
- 1981 E. Mravlag: Untersuchungen zum zeitlichen Anwachsen einer niederfrequenten Instabilität großer Amplitude in einer Ein-Emitter-Q-Maschine.

- 1981 R. Blankenhorn: Die Abhängigkeit der MHD-Energiewandlung mit Verbrennungsgasen von der turbulenten Grenzschichtströmung des Kanals.
- 1981 M. Oertl: Einfluß von Gitterpotentialen in einem ruhigen Plasma auf die Energieverteilung der Ionen.
- 1984 L. Lerch: Räumliche Plasmawellenechos in zylindrischen Plasmen.
- 1985 N. Schupfer: Axialsymmetrische elektromagnetische Eigenschwingungen von plasmagefüllten toroidalen Resonatoren.
- 1987 R. Richter: Schwarmexperimente zu Ionen-Molekül-Reaktionen mit Relevanz für Ätz- und Syntheseplasmen.
- 1988 E.R. Hensler: Coulombwechselwirkung im magnetisierten Plasma.
- 1990 M. Hörhager: Lineare und schwach nichtlineare Theorie von Plasmaschwingungen in der Pierce Diode.
- 1993 H. Pedit: Kinetische Modellierung zweidimensional begrenzter, stoßfreier Plasmasysteme.
- 1994 P. Spanel: Experimentelle Studien zum Reaktionsprozess in ionisierten Gasen bei thermischen Energien mittels SIFT- und FALP-Techniken.
- 1994 T. Hladschik: Reaktorphysikalische Untersuchungen zur ITER-Fusionsdynamik.
- 1994 H.A. Werthmann: Zur Effizienz der Ionen-Bernstein-Wellen-Heizung von Fusionsplasmen.
- 1995 H. Maier: Ein  $(1d,2v)$  Q-Maschinenmodell unter Berücksichtigung von symmetrischen Umladungsstößen und elastischen Elektronenstößen.
- 1995 N. Jelic: Experimentelle und theoretische Untersuchungen der Plasmaparameter bei Anwesenheit von lokalisierten Raumladungsschichten und Doppelschichten.
- 1996 M. Winter: Experimentelle und numerische Untersuchung von nichtlinearen Effekten in einer dissipativen Alkaliplasmadiode.
- 1996 M.M. Kassab: Näherungsweise Entwicklung vielfacher Zeitskalenableitungen angewandt auf Plasmatransport und Relaxationstheorien.
- 1997 A. Lagg: Energiereiche Teilchen in der inneren Jupiter-Magnetosphäre: Simulation und Ergebnisse des EPD-Experimentes an Bord der Raumsonde Galileo.
- 1998 F. Mairey: Kinetische Untersuchung von Ionisation und Rekombination in begrenzten Plasmen.

- 1999 D. Strele: Effect of C60 Anions on the potential relaxation instability and the ion heating by the inhomogeneous energy density driven instability in a Q-Machine plasma.
- 2002 A. Qayyum: Reaktive Wechselwirkung von einfach und doppelt geladenen Molekuelionen mit in Fusionphysik relevanten Oberflaechen.
- 2003 R. Khanal: Ein Kinetisches Trajektoriensimulations-Modell für begrenzte Plasmen.
- 2004 W. Schustereder: Analysis of plasmas and nanoparticles.
- 2004 P. Balan: Experimental investigations of the edge region of magnetized fusion plasmas.
- 2005 T. Tepnual: Ion surface reaction studies by tandem mass spectrometry.
- 2006 M. Janda: The Study of plasma induced chemistry in gaseous mixture N<sub>2</sub>-CO<sub>2</sub>-H<sub>2</sub>O.
- 2006 L. Feketeova: Reactive interactions of singly and doubly charged molecular ions with various surfaces relevant for fusion technologie.
- 2008 D. Huber: Untersuchung des Plasmas im Reaktiven Niederspannungs-Ionenplattier-Prozess bei der Herstellung von Metall-Oxid-Schichten.

## 6.4 Laufende Doktorarbeiten 2008

- Abid Aleem (P. Scheier): Development of a gas cluster ion beam source based on plasma discharges
- F. Bint-e-Munir (S. Kuhn): Comprehensive analytical treatment of the magnetised plasma-wall transition
- B.H. Cho (K. Schöpf): Flux surface shape effects on fast ion trajectories in toroidal magnetic configurations
- A. Din (S. Kuhn): Kinetic theory of emissive probes
- N. Endstrasser (P. Scheier): Determination of electron impact cross-sections for small hydrocarbons interacting with fusion-relevant surfaces

- T. Gassner (K. Schöpf): Synergetic effects on fast ion distribution in tokamak plasmas
- A. Hallbauer (H. Pulker): Herstellung und Charakterisierung von ionenplattierten Nb<sub>2</sub>O<sub>5</sub>- und HfO<sub>2</sub>-Schichten
- M. Kamran (S. Kuhn): Tonks-Langmuir model with a spatially varying ion polytropic coefficient
- S. Konzett (A. Kendl): Extended computation of edge plasma turbulence
- D. Kupelwieser (S. Kuhn): Extended variational principle for tokamak plasmas
- M. Khan (K. Schöpf): Resonant fast ion transport in tokamak plasmas
- C. Maszl (R. Schrittwieser): Experimental investigations of edge plasma turbulence in linear and toroidal devices
- A. Mauracher (M. Probst): Theoretical and experimental investigations of electron attachment to biomolecules
- A. Murawski (H. Pulker): Untersuchung eines Flammplasmas
- B. Rasul (P. Scheier): Ion surface collisions for the investigation of fusion relevant Tungsten, Beryllium and Carbon surfaces
- S. Schlichtherle (H. Pulker): Untersuchung gepulster ionenunterstützter Beschichtungsprozesse
- A. Schneider (S. Kuhn): Comprehensive analytical description of the unmagnetised plasma-wall transition, with particular emphasis on the intermediate region
- J. Seebacher (S. Kuhn): Consistent kinetic trace impurity transport and chemistry modelling in fusion plasmas
- G. Strauss (H. Pulker): Plasma analysis of different ion and plasma assisted PVD-processes

