

# Curriculum Vitae

— Thomas Buchert

## Personal Information

*Birth* : August 18th, 1959

*Nationality* : German

*Other Languages* : Fluent in English and French (spoken and written) ; Basics in Italian, Spanish and Japanese

*Profession* : Professor at Université Claude Bernard, Lyon, France

### Responsibilities

*and Memberships* : Staff member at the Observatory of Lyon, C.R.A.L., Lyon, France

Head of GALPAC Team (Galaxy Physics, Instrumentation and Theory)

Head of Theoretical Cosmology Group

Coordinator of CRAL/IPNL–Collaboration on Dark Energy and Dark Matter

Master Programme : Ecole Normale Supérieure, Lyon, France

External Collaborator : S.D.S.S. Collaboration

Foundational Questions in Physics & Cosmology, F.Q.X.i.

*Coordinates* : [www.cosmunix.de](http://www.cosmunix.de)

*Emails* : [buchert@obs.univ-lyon1.fr](mailto:buchert@obs.univ-lyon1.fr) / [thomas.buchert@ens-lyon.fr](mailto:thomas.buchert@ens-lyon.fr) / [buchert@cosmunix.de](mailto:buchert@cosmunix.de)

## Education/Career

1966–1978 : Primary and High–School in Villingen–Schwenningen

1978–1984 : Studies of Theoretical Physics at Ludwig–Maximilians–Universität (L.M.U.), Munich

1983–1984 : Diploma thesis at Max–Planck–Institut für Astrophysik (M.P.A.) in Garching

Oct. 26th, 1984 : Diploma in Theoretical Physics (Dipl.–Phys.)

1984–1988 : Ph.D. thesis at M.P.A. in Garching

July 14th, 1988 : Ph.D. in Theoretical Physics (Dr.rer.nat.)

Thesis topic : *‘The Pancake Theory of Formation of Supergalactic Structures – Analytical Foundations’*; Thesis advisors : Prof. G. Börner and Prof. J. Ehlers

1989–1993 : Habilitation thesis at M.P.A. in Garching

July 13th, 1994 : Ph.D. in Astronomy – Habilitation – (Dr.rer.nat.habil.)

July 18th, 1995 : Lecturer Degree (Priv.–Doz.) at L.M.U. in Munich

Thesis topic : *‘Inhomogeneous Newtonian Cosmogony’*

2005 : Qualification as University–Professor in France

Sept. 1st, 2007 : Titularisation as University–Professor in France

## Positions

1984–1995 : Research Associate at M.P.A. Garching, Germany

1995–1997 : Research Associate at L.M.U. Munich, Germany

1997–1998 : Research Associate at T.U.M. Garching, Germany

1998–1999 : Associated Member of Personnel at C.E.R.N. Geneva, Switzerland  
 1999–2000 : C.O.E. Researcher at National Astronomical Observatory, Tokyo, Japan  
 2001–2006 : Research Associate at T.U.M. Garching, Germany  
 SSem 2006 : Chair of Theoretical Physics, University of Bielefeld, Germany  
 1995–2007 : Privat–Dozent at L.M.U. Munich, Germany  
 Since 2007 : Professor at Université Lyon 1 ‘Claude Bernard’, Lyon, France

### Visiting Positions

1988 : Visiting Researcher at N.O.R.D.I.T.A., Copenhagen, Denmark  
 1989–1994 : Visiting Researcher at Observatory of Paris, D.A.E.C., and I.A.P., Paris, France  
 1994 : Guest Scientist at the Aspen Center for Physics, U.S.A.  
 1997 : Visiting Professor at University of Osaka, and Tohoku University Sendai, Japan  
 1997 : Visiting Professor at Kansas University, Lawrence, U.S.A.  
 1999/2000 : Tomalla Visiting Professor at University of Geneva, Switzerland  
 1999–2000 : Visiting Professor at Tohoku University Sendai, Japan  
 2000 : Visiting Professor at Tokyo Institute of Technology, Japan  
 2000–2005 : Visiting Professor at University of Pavia, Italy  
 2001 : J.S.P.S. Invited Fellow at Tokyo Institute of Technology, Japan  
 2002–2003 : Monkasho Invited Professor at The University of Tokyo, R.E.S.C.E.U., Tokyo, Japan  
 2003 : Visiting Professor at Observatory of Nice, France  
 2004 : Visiting Professor at Tohoku University Sendai, Japan  
 2004/2005 : Visiting Professor at C.P.T. Marseille, France  
 2005 : Visiting Professor at Observatory of Paris, L.U.T.H., France  
 2006 : Visiting Professor at Dept. of Appl. Math., Cape Town, South Africa  
 2007 : Visiting Professor at Observatory of Paris, L.U.T.H., France  
 2007 : Visiting Professor at Paris University 7, France

### Shortlisted/Interview for the following Positions :

1995 : Associate Professor at L.M.U. Munich, Germany  
 1995 : Permanent Research Position at M.P.A. Garching, Germany  
 2000 : Associate Professor at L.M.U. Munich, Germany  
 2001 : Associate Professor at Würzburg University, Germany  
 2002 : Reader at Portsmouth University, U.K.  
 2003 : Full Professor at Lancaster University, U.K.  
 2005 : Associate Professor at T.U.M. Garching, Germany  
 2006 : Scientific Coordinator, I.M.P.R.S. School, Max–Planck–Institut für Physik, Germany  
 2007 : Full Professor at Université Claude Bernard, Lyon, France\*\*  
 2007 : Full Professor at Ecole Normale Supérieure, Lyon, France  
 \* offered    \*\* offered and accepted

## Awards and Grants

- 1978 : Scheffel Award by German Literature Society
- 1988–1994 : ‘Schwerpunkt’–Grant by Deutsche Forschungsgemeinschaft (D.F.G.)
- 1995–2006 : Project Representative ‘Sonderforschungsbereich S.F.B. 375’ :  
(Research grants in Astro–Particle physics)
- 1998 : Associate Membership at C.E.R.N. Geneva, Switzerland
- 1999 : Tomalla Foundation, Switzerland
- 1999–2000 : Center of Excellence Grant, National Astronomical Observatory Tokyo, Japan
- 2000 : Tomalla Foundation, Switzerland
- 2001 : J.S.P.S. Invitation Fellowship, Japan
- 2002–2003 : Monkasho Award, The University of Tokyo, Japan
- 2008–2009 : Délégation C.N.R.S. (6 months), France

## Teaching

- 1990 : Seminar (Large–scale Structure and Galaxy Formation), L.M.U. (in German)
- 1993 : Experimental Physics Tutorial (Advanced Lab. Course), L.M.U. (in German)
- 1993 : Lector : Physics School (The Evolution of Galaxies), Bad Honnef (in English)
- 1994 : Seminar (Newtonian Cosmology and Statistics), L.M.U. (in German)
- 1995 : Lector : School for Teachers (Cosmology), Bad Honnef (in English)
- 1995 : Lector : Enrico Fermi School (Dark Matter), Varenna, Italy (in English)
- 1996–1997 : Lecture Courses (Cosmology I and II), L.M.U. (in German)
- 1997–1998 : Lecture Course (Kinetic Theory), L.M.U. (in German)
- 1998 : Lecture Course (Theoretical Mechanics TLI), L.M.U. (in German)
- 2001–2002 : Lecture Course (Kinetic Theory), L.M.U. (in German)
- 2003 : Lecture Course (Newtonian Gravity), L.M.U. (in German)
- 2003–2004 : Lecture Course (Structure Formation), L.M.U. (in German)
- 2004 : Lector : VII. Ecole de Cosmologie, Marseille, France (in French)
- 2004–2005 : Lecture Course (Newtonian & Relativistic Cosmology), L.M.U. (in German)
- 2005–2006 : Lecture Course (General–relativistic Cosmology), L.M.U. (in German)
- 2006 : Lecture Course, International Graduate School (Newton’s & Einstein’s gravitation theories of continuous media), University of Bielefeld , Germany (in German)  
in association with Univ. of Paris 6, Paris 7, Paris–Sud 11, Saclay, France
- 2006 : Lector : XIIth. Brazilian School of Cosmology & Gravitation, Rio de Janeiro, Brazil (in English)
- 2006 : Lecture Series (Backreaction Issues in Relativistic Cosmology),  
University of Cape Town, South Africa (in English)
- 2008 : Lecture Course (Introduction to Theories of Gravitation), Master 1,  
Ecole Normale Supérieure, Lyon, France (in French)
- 2008 : Experimental Physics Tutorial (Basic Lab. Course), Université Lyon 1, France (in French)
- 2008 : Agrégation Physique (Teacher Formation), Ecole Normale Supérieure, Lyon, France (in French)
- 2008 : Doctoral Course (Spatial Average of Einstein’s Equations and the Dark Energy  
Problem in Cosmology), Ecole Normale Supérieure, Lyon, France (in French)
- 2008 : Lecture Course (Mathematical Methods in Physics), Master 1,  
Ecole Normale Supérieure, Lyon, France (in French)

- 2008 : Informatics Tutorial (Basic Lab. Course), Université Lyon 1, France (in French)  
 2009 : Agrégation Physique (Teacher Formation), Ecole Normale Supérieure, Lyon, France (in French)  
 2009 : Lecture Course (Gravitational Systems), Master 2 (P22),  
 Ecole Normale Supérieure, Lyon, France (in French) – canceled due to accident  
 2009 : Lecture Course (Introduction to Theories of Gravitation), Master 1,  
 Ecole Normale Supérieure, Lyon, France (in French) – canceled due to accident  
 2009 : Lecture Course (Mathematical Methods in Physics), Master 1,  
 Ecole Normale Supérieure, Lyon, France (in French) – represented due to accident  
 2010 : Lecture Course (Gravitational Systems), Master 2 (P22),  
 Ecole Normale Supérieure, Lyon, France (in French)  
 2010 : Lecture Course (Introduction to Theories of Gravitation), Master 1,  
 Ecole Normale Supérieure, Lyon, France (in French)

## Supervising

I have supervised and co-supervised in Germany\* :

12 Diploma (D) students, 1 Teacher Exam (T) student, 11 Ph.D. (P) students (two ongoing).

(\* In many cases a co-supervisor had to be present due to formal reasons.)

and in France :

1 Master Student (M1), 3 Master Students (M2), 2 Ph.D. (PF) students (one ongoing).

### Detailed List for Germany :

List of thesis works supervised (with Prof. Börner at M.P.A. : D1–D5, P1–P5, P7, Prof. Wagner at L.M.U. : D6, D7, D11, P6, P8, P10, Prof. Klinkhamer (Univ. Karlsruhe) : D12, and Prof. Schwarz (Univ. Bielefeld) : P11)

(D1) Udo Weigelt : *Die großräumige Struktur des Universums : Statistische Analyse von Pekuliargeschwindigkeitsfeldern elliptischer Galaxien*  
 (L.M.U. Munich, July 1989)

(D2) Robert Klaffl : *Numerische Simulationen zum Pancake-Modell*  
 (L.M.U. Munich, 1991)

(D3) Arno Weiss : *Simulation und statistische Analyse strahlenförmiger Galaxienkataloge im dreidimensionalen Pancake-Modell*  
 (L.M.U. Munich, May 1992)

(D4) Matthias Vanselow : *Verallgemeinerung von kosmologischen Lösungen im Rahmen der Lagrangeschen Störungstheorie*  
 (L.M.U. Munich, May 1995)

- (D5) Michael Platzöder : *Statistische Analyse der Galaxienverteilung mit Hilfe von Minkowski-Funktionalen*  
(L.M.U. Munich, June 1995)
- (D6) Jens Schmalzing : *Robuste morphologische Maße für großräumige Strukturen im Universum*  
(L.M.U. Munich, September 1996)
- (D7) Claus Beisbart : *Morphologie und Dynamik kosmischer Materieaggregationen*  
(L.M.U. Munich, July 1997)
- (D8) Andreas Rabus : *Anwendung morphologischer Maße auf Simulationen Dunkler Materie und auf Galaxienkataloge*  
(L.M.U. Munich, August 1998)
- (D9) Christian Sicka : *Hierarchische Kosmologien, Mittelungsproblem und Skalierungseigenschaften*  
(L.M.U. Munich, November 1998)
- (D10) Stephan Lante : *Zur relativistischen Erweiterung kosmologischer Modelle der Strukturbildung*  
(L.M.U. Munich, March 2000)
- (D11) Matthias Ostermann : *Grundlagen der Formulierung einer Lagrangeschen Störungstheorie in der relativistischen Kosmologie*  
(L.M.U. Munich, May 2003)
- (D12) Alexander Wiegand : *Ein skalendifferenziertes Entwicklungsmodell des inhomogenen Universums*  
(Univ. Karlsruhe, Germany, October 2009)
- (T1) Susanne Adler : *Lagrangesche Theorie der Strukturbildung in kosmologischen Fluiden mit Druck*  
(L.M.U. Munich, January 1998)
- (P1) Peter Schiller : *Numerische Simulationen der Entwicklung großräumiger Strukturen im Universum*  
(L.M.U. Munich, June 1992)
- (P2) Udo Weigelt : *Robuste statistische Verfahren zur Analyse stark fehlerbehafteter Datensätze : Pekuliargeschwindigkeits – und Dichtefelder in der Kosmologie*  
(L.M.U. Munich, May 1992)
- (P3) Arno Weiss : *Numerische und statistische Verfahren zur kosmologischen Simulation der großräumigen Galaxienverteilung unter Verwendung der Lagrangeschen Störungsrechnung*  
(L.M.U. Munich, August 1995)
- (P4) Georgios Karakatsanis : *Optimierung der Lagrangeschen Störungstheorie für die analytische Simulation kosmologischer Strukturen*  
(L.M.U. Munich, August 1995)
- (P5) Robert Klaffl : *Numerical simulations of large-scale structure*  
(student left for a job before finalizing the thesis)

- (P6) Martin Kerscher : *Morphologie großräumiger Strukturen im Universum*  
(L.M.U. Munich, January 1998)
- (P7) Jens Schmalzing : *On statistics and dynamics of cosmic structure*  
(L.M.U. Munich, September 1999)
- (P8) Claus Beisbart : *Measuring cosmic structure. Minkowski valuations and mark correlations for cosmological morphometry*  
(L.M.U. Munich, November 2000)
- (P9) Christian Sicka : *Effektive Dynamik inhomogener Kosmologien*  
(L.M.U. Munich, May 2003)
- (P10) Matthias Ostermann : *Minkowski valuations of the Sloan Digital Sky Survey and Lagrangian theory of structure formation in relativistic cosmology* (expected end of 2011)
- (P11) Alexander Wiegand : *Relativistic perturbation theory and non-perturbative models in inhomogeneous cosmology* (expected end of 2012)

#### Detailed List for France :

- (M1/1) Marc Geiller : *Integral properties of exact solutions to Einstein's equations*  
(Ecole Normale Supérieure, Lyon, France, June 2008)
- (M2/1) Xavier Roy : *Univers inhomogène et Gaz de Chaplygin*  
(Université Montpellier, France, June 2008)
- (M2/2) Charly Nayet : *Les équations d'Einstein moyennées spatialement et les modèles non-homogène en cosmologie relativiste*  
(Ecole Normale Supérieure, Lyon, France, September 2008)
- (M2/2) Mickaël Rigault : *Estimation du terme de backreaction à différentes échelles dans une simulation d'univers  $\Lambda$ CDM Horizon*  
(Université Lyon 1, France, July 2010)
- (PF/1) Charly Nayet : *Les équations d'Einstein moyennées spatialement et les modèles non-homogène en cosmologie relativiste*  
(Université Lyon 1, France, stopped after first year)
- (PF/2) Xavier Roy : *Univers inhomogène et l'Univers Primordial*  
(Université Lyon 1, France, second year)

### Fund Raising and Exchange Programs

- 1991–1993 : Exchange Program of Max–Planck–Society and Chinese Academy of Sciences, M.P.G.–C.A.S.
- 1995–1997 : Student exchange grants for France (D.A.A.D.)
- 1996 : Student exchange grant for Spain (Acciones Integradas)
- 1995–1998 : Coordinator for Munich : E.C.N. Cosmology (planning phase)
- 1995–1997 : S.F.B. 375 (Research in Astro–Particle physics) : Grants for 1 Ph.D. student and 1 postdoc
- 1998–2000 : S.F.B. 375 (Research in Astro–Particle physics) : Grants for 1 Ph.D. student and 2 postdocs

- 1999–2002 : D.F.G. grant for Ph.D. student  
 2001–2003 : S.F.B. 375 (Research in Astro–Particle physics) : Grants for 2 postdocs  
 2004–2006 : S.F.B. 375 (Research in Astro–Particle physics) : Grants for 1 Ph.D. student and 1 postdoc  
 2008–2011 : Grants for two Ph.D. students (Ecole Doctorale Lyon)  
 2010–2011 : Fédération de Physique André Marie Ampère (Dark Energy and Dark Matter, 18 k€)

## Workshop Organization

- 1989 : M.P.A. Progress Report on Cosmology and Gravitational Lensing  
 1993 : 4th M.P.G.–C.A.S. Workshop on High–energy Astrophysics  
 1996 : 2nd S.F.B. Workshop on Astro–particle Physics  
 2005 : Spacetime in Action : One hundred years of Relativity, University of Pavia, Italy  
 2007 : Cosmology School and Workshop, Cargèse, France  
 2008 : 2nd C.R.A.L./I.P.N.L. Conference on Dark Energy and Dark Matter, Lyon, France  
 2009 : U.N.E.S.C.O. Conference on The Dark Universe, Paris, France

## Refereeing

Regular scientific refereeing for International Journals, e.g. *Astron. & Astrophys.*, *New Astronomy*, *Mon. Not. Roy. Astr. Soc.*, *The Astrophys. J.*, *The Astrophys. J. Lett.*, *Phys. Rev. D*, *Rev. Mod. Phys.*, *Phys. Lett. A, B*, *Gen. Rel. Grav.*, *Class. Quant. Grav.*, *Annalen der Physik*, *Physica Scripta A*, *PNAS*, *J. of Mod. Phys. D*, Foundations of Physics, as well as for Student Fund Organizations (e.g. *DFG*; *Studienstiftung*), National Fund Organizations (e.g. *N.S.F. Grants*, *U.S.A.*, *The Netherlands*, *South Africa*), and for Books (e.g. *Cambridge Univ. Press*).

## Selected Invited Talks and Colloquia

*Not included in this list : Talks at 'local' institutes (Max–Planck–Institut f. Astrophysik, Max–Planck–Institute f. Extraterrestrische Physik, Max–Planck–Institut f. Physik, European Southern Observatory, Ringberg Castle and Bad Honnef) and local universities (Ludwig–Maximilians–U., Technical U. and Astronomical Institute) in Munich/Garching and, from 2007, in Lyon (UCBL, ENS, IPNL).*

- 1984 : Z.I.F., Bielefeld, Germany  
 1988 : N.O.R.D.I.T.A., Copenhagen, Denmark  
 1989 : Perugia, Italy  
 1989 : Amsterdam and Leiden, The Netherlands  
 1989 : Highlight–Lecture of the Astronomical Society, Graz, Austria  
 1990 : Max–Planck–Institute for Astronomy, Heidelberg, Germany  
 1990 : Huangshan, PR China

1990 : University of Valencia, Spain  
 1990 : Observatoire de Paris, D.A.E.C., France  
 1991 : University of Valencia, Spain  
 1991 : Observatoire de Meudon, D.A.E.C., France  
 1993 : Niels-Bohr-Institute, Copenhagen, Denmark  
 1994 : Aspen, Colorado, U.S.A.  
 1994 : Observatoire de Paris, D.A.E.C., France  
 1994 : Nandaihe, PR China  
 1994 : Geltow, Potsdam, Germany  
 1995 : Int. School Enrico Fermi, Varenna, Italy  
 1995 : Observatoire de Paris, D.A.E.C., France  
 1995 : University of Valencia, Spain  
 1995 : Berlin Dahlem, Germany  
 1996 : E.T.H., Zürich, Switzerland  
 1996 : Ringberg, Tegernsee, Germany  
 1996 : L.A.E.F.F., Madrid, Spain  
 1997 : Lawrence, Kansas, U.S.A.  
 1997 : Osaka University, Japan  
 1997 : Tohoku University Sendai, Japan  
 1998 : University of Essen, Germany  
 1998 : Shanghai Observatory, PR China  
 1999 : C.E.R.N., Geneva, Switzerland  
 1999 : University of Geneva, Switzerland  
 1999 : National Astronomical Observatory, Tokyo, Japan  
 1999 : Tohoku University Sendai, Japan  
 1999 : Hiroshima, Japan  
 2000 : University of Geneva, Switzerland  
 2000 : Tohoku University Sendai, Japan  
 2000 : Tokyo Institute of Technology, Japan  
 2000 : R.E.S.C.E.U., The University of Tokyo, Japan  
 2001 : University of Pavia, Italy  
 2001 : C.N.R.S., Institut Henri Poincaré, Paris, France  
 2001 : University of Würzburg, Germany  
 2001 : Tokyo Institute of Technology, Japan  
 2001 : R.E.S.C.E.U., The University of Tokyo, Japan  
 2002 : Waseda University, Tokyo, Japan  
 2002 : University of Portsmouth, U.K.  
 2002 : Tokyo Institute of Technology, Japan  
 2002 : R.E.S.C.E.U., The University of Tokyo, Japan  
 2002 : University of Pavia, Italy  
 2003 : Observatoire de la Côte d'Azur, Nice, France  
 2003 : University of Lancaster, U.K.  
 2003 : Tokyo Institute of Technology, Japan  
 2004 : 21st C.O.E. Symposium, Tohoku University Sendai, Japan  
 2004 : Tohoku University Sendai, Japan  
 2004 : C.I.R.M. and C.P.T., Marseille, France

2004 : University of Pavia, Italy  
2005 : C.N.R.S., Observatoire de Paris, France  
2005 : Observatoire de Paris, L.U.T.H., France  
2005 : C.I.R.M., Marseille, France  
2005 : University of Geneva, Switzerland  
2005 : Observatoire de Paris, L.U.T.H., France  
2006 : R.W.T.H., University of Aachen, Germany  
2006 : C.N.R.S., I.A.P. Paris, France  
2006 : University of Bielefeld, Germany  
2006 : XII. B.S.C.G., Rio de Janeiro, Brazil  
2006 : Dept. of Appl. Math., Cape Town, South Africa  
2007 : Spinoza Institute, University of Utrecht, The Netherlands  
2007 : Observatoire de Paris, L.U.T.H., France  
2007 : Observatoire de Lyon, C.R.A.L., France  
2007 : C.N.R.S., Observatoire de Paris, France  
2007 : Université Claude Bernard, Lyon, France  
2007 : Albert Einstein Institute, Golm, Germany  
2007 : University of Pavia, Italy  
2007 : Dark Energy Workshop, Montpellier, France  
2007 : University of Ulm, Germany  
2008 : L.P.N.H.E., Paris, France  
2008 : E.P.F. Lausanne, Switzerland  
2008 : F.Z. Karlsruhe, Germany  
2008 : University of Ulm, Germany  
2010 : L.A.M., Marseille, France  
2010 : University of Konstanz, Germany