

# Curriculum Vitae

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BRUNO EL-BENNICH

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**Date of Birth:** 10/06/1972

**Birthplace:** Tübingen, Germany

**Citizenship:** French

## Current Position:

**October 2007 – present** *Postdoctoral fellow* at the Physics Division, Argonne National Laboratory, Illinois.  
Supervisor: C.D. Roberts.

## Education:

**2004** Ph.D. in Physics, Rutgers University, New Jersey.

**1998** *Diplomphysiker* (M.Sc.) in Theoretical Physics, Technische Universität Kaiserslautern, Germany.

**1994–1995** Erasmus fellow, *European Mobility Scheme for Physics Students* program, University of Bath, Great Britain.

**1993** *Vordiplom* in Physics and Mathematics, Technische Universität Kaiserslautern, Germany.

## Professional Experience:

**2004–2007** Postdoctoral Research Associate at *Laboratoire de Physique Nucléaire et Hautes Énergies* (LPNHE), Université Pierre et Marie Curie. Research on non-perturbative aspects, strong phases and *CP* violation in heavy meson decays; study of models for covariant heavy-to-light transition form factors and electromagnetic form factors. Supervisor: B. Loiseau.

**1999–2004** Graduate Assistant, Rutgers University, New Jersey. Ph.D. thesis on relativistic effects in proton-antiproton annihilation in the framework of quark models: “*Antiproton-proton annihilation into two mesons: the role of relativistic distortions*”. Research on nucleon-antinucleon interactions in large  $N_c$  approaches. Thesis advisor: W.M. Kloet.

**1996–1998** Master’s thesis, Université Pierre et Marie Curie. Research on nucleon-antinucleon optical potentials: “*Refining the inner core of the Paris  $\bar{N}N$  potential*”. Thesis advisor: R. Vinh Mau.

## Awards and Grants:

Co-Recipient, CNRS-IN2P3 Theory Grants, LPNHE–Paris/INFN–Frascati collaboration, 2007–2008.

Co-Recipient, CNRS/FAPESP (France/São Paulo State) bilateral research and travel grant No. 05/55155–2, 2006–2008.

Participant, CNRS/Polish Academy of Sciences (France/Poland) CSI–12 Collaboration grant, 2006–2008.

Marie Curie fellow, *International Reintegration Grant* No. 516228 awarded by the European Commission, February 2005–January 2007.

Research Assistantship, Department of Physics and Astronomy, Rutgers University, 2001–2002 and 2002–2003.

National Science Foundation scholarship for the IV Latin American Symposium on Nuclear Physics, Mexico City, 2001.

*Erasmus* travel fellowship for study-abroad year, European Mobility Scheme for Physics Students, 1994–1995.

### **Professional Responsibilities:**

Referee for: *Journal of Physics G: Nuclear and Particle Physics*; *International Journal of Modern Physics E*.

Organizer of the workshop “*QCD Bound States: Methods and Properties*” at Argonne National Laboratory, Illinois, June 15–19, 2009.

Theory Seminar organizer at Physics Division, Argonne Physics Division (2007–2009).

Organizer of the project “*Phenomenological studies of reactions involving heavy flavors*” (2006–2008); a collaboration between the LPNHE, Université Pierre et Marie Curie, Paris, the Instituto Tecnológico de Aeronáutica, São José dos Campos, the Insitituto de Física Teórica & Universidade Cruzeiro do Sul, São Paulo.

Administration duties at Université Pierre et Marie Curie (2005–2007): preparation, organization and grading of midterm and final-year exams. Member of the thesis committee for the Master’s thesis of Diogo Boito, July 2006.

Co-organizer of the particle phenomenology seminar at LPNHE, Université Pierre et Marie Curie, Paris.

### **Teaching Experience:**

**Autumn 2006** Lecturer, *Mathematical Methods for Physicists* (third-year undergraduate level); recitation and lab instructor for the *Optics and Waves* undergraduate course, Université Pierre et Marie Curie.

**Spring 2006** Lab instructor of a two-week experimental Master’s project (full-time) for five students, École Normale Supérieure de Cachan & Université Pierre et Marie Curie.

**Autumn 2005** Recitation and lab instructor in *Thermodynamics and Applications to Biophysics* and in *Optics and Waves* for undergraduate students in the life sciences, Université Pierre et Marie Curie.

**Spring 2005** Recitation instructor in *Thermodynamics and Applications to Biophysics* for undergraduate students in the life sciences, Université Pierre et Marie Curie.

**Spring 2004** Workshop and lab instructor in the *Physics for the Sciences* class for undergraduate students in the life sciences, Rutgers University.

**Autumn 2003** Workshop instructor for physics majors in *Advanced General Physics*, Rutgers University.

**2001–2003** Course assistant and lab coordinator for *Concepts of Physics for Humanities and Social Science Students* (each year during one semester), an experimental course teaching elements and history of physics, Rutgers University.

Summer recitation instructor in *General Physics I and II*, Rutgers University.

**1999–2000** Teaching Assistant, *General Physics I and II* and *Analytical Physics I* labs and recitations (freshman and sophomore level), Rutgers University.

### **Supervision of Research:**

Diogo Boito, Master’s thesis “*D-meson decays into three pions*”, Université Pierre et Marie Curie (subsequently Ph.D. student at Universitat Autònoma de Barcelona), September 2005–July 2006.

Rehda Moulla, undergraduate project “*Dispersion relations in relativistic quark models*”, Université Pierre et

Marie Curie, (subsequently graduate student at the Université Pierre et Marie Curie), June 2005–August 2005.

### **Conference Participation:**

#### **2009**

Invited talk, *Light Cone 2009, Relativistic Nuclear and Particle Physics*, São José dos Campos, São Paulo, Brazil.

#### **2008**

Invited talk, *Light Cone 2008, Relativistic Nuclear and Particle Physics*, Mulhouse, France.

#### **2007**

Contributed talk, *Menu 2007, 11th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon*, Jülich, Germany.

#### **2006**

Contributed talk, *18th International IUPAP Conference on Few-Body Problems in Physics*, Santos, Brazil.

Invited talk, *International Workshop on Relativistic Few-Body Physics*, Universidade Cruzeiro do Sul, São Paulo, Brazil.

Contributed talk, *Rencontre de Physique des Particules*, Institut Henri Poincaré, Paris.

Contributed talk, *Meson 2006, 9th International Workshop on Meson Production, Properties, and Interaction*, Kraków, Poland.

Invited talk, *Three-Body Charmless B-Decays Workshop*, Université Pierre et Marie Curie, Paris.

#### **2005**

Contributed talk, *LEAP05, International Conference on Low Energy Antiproton Physics*, Bonn–Jülich, Germany.

*Rencontres de Moriond*, La Thuille, Val d'Aosta, Italy.

#### **2004**

Poster presentation, *Baryon 2004*, École Polytechnique, Palaiseau, France.

#### **2003**

*Nuclear Physics Gordon Conference*, Colby College, Waterville, Maine.

Contributed talk, April Meeting of the American Physical Society, Philadelphia, Pennsylvania.

#### **2002**

Contributed talk, *N\*2002 Workshop on the Structure of Excited Nucleons*, University of Pittsburgh, Pennsylvania.

*Exclusive Processes at large t* workshop, Jefferson Lab, Newport News, Virginia.

#### **2001**

Poster presentation at the *IV Latin American Symposium on Nuclear Physics*, Colegio Nacional, Mexico City, Mexico.

### **Participation in workshops and schools:**

#### **2009**

*QCD Bound States: Properties and Methods* (Organizer), Physics Division, Argonne National Laboratory, Illinois, USA, June 15–19.

#### **2008**

*U.S. Midwest Theory Get-Together* (Organizer), Argonne National Laboratory, Illinois, October 17–18, 2008.

Invited lecturer, *Helmholz International Summer School on Heavy Quark Physics*, Bogoliubov Laboratory of Theoretical Physics, Dubna, Russia, August 11–21, 2008.

## 2007

Invited talk, *Confinement: connecting the light- and heavy-quark domains*, Workshop at the ECT\* Trento, Italy.

## 2005

*International W.E. Heraeus Summer School on Flavour Physics and CP Violation*, Technische Universität Dresden, Germany.

Visiting Fellow (two weeks), *Effective Field Theory, QCD, and Heavy Hadrons* workshop, Institute for Nuclear Theory, University of Washington, Seattle, Washington.

## 2003

Visiting Fellow (three weeks), *Theories of Nuclear Forces and Nuclear Systems* workshop, Institute for Nuclear Theory, University of Washington, Seattle, Washington.

*Prospects in Theoretical Physics*, Institute for Advanced Studies, Princeton, New Jersey.

## 2001

*National Nuclear Physics Summer School*, College of the Atlantic, Bar Harbor, Maine.

## 2000

*National Nuclear Physics Summer School*, University of California, Santa Cruz, California.

## Invited Seminars:

“*Hadronic form factors in non-leptonic heavy-meson decays*”, Institut de Physique, Université de Liège and Institut für Theoretische Teilchenphysik, Universität Karlsruhe.

“*Nuclear effects in flavor physics: constraining Standard Model predictions in B decays*”, Rutgers University, New Jersey and CUNY New York Tech, Brooklyn, New York, November 2008; at Instituto de Física Teórica, UNESP, São Paulo, December 2008.

“*Three-body charmless B-decays and an alternative route to the isobar model*”, Kent State University, Ohio, April 2008.

“*The beauty of three bodies without charm*”, at the Institut de Physique Nucléaire, Université Claude Bernard, Lyon, at LPNHE Jussieu, Paris and at the Institut de Physique Nucléaire, Université Paris-Sud, Orsay, March and April 2007.

“*Scalar and vector meson interferences in hadronic three-body B-decays*”, Argonne National Laboratory, Illinois, February 2007.

“*Three-body decays of B-mesons and CP violation*”, at Rutgers University, New Jersey, May 2006, at the Instituto de Física, University of São Paulo, São Paulo, August 2006, and at Laboratori Nazionali di Frascati, Italy, January 2007.

“*Lorentz contraction, geometry and range in  $\bar{p}p$  annihilation into two mesons*”, Karl Eberhards Universität, Tübingen, May 2005.

“*Antiproton-proton annihilation into two light mesons: relativistic distortions and large  $N_c$ -color expansion*”, LPNHE, Université Pierre et Marie Curie, Paris, July 2004.

“*Antiproton-proton annihilation in a constituent quark model*”, Institute for Nuclear Theory, University of Washington, Seattle, October 2003.

“*Final-state interactions in  $\bar{p}p$  annihilation into two pions*”, Rutgers University, New Jersey, March 2003.

“*Relativistic spin effects in the reaction  $\bar{p}p \rightarrow \pi\pi$* ”, LPNHE, Université Pierre et Marie Curie, Paris, June 2002.

*“Relativistic final-state corrections in quark-models of  $\bar{p}p$  annihilation”*, LPTPE, Université Pierre et Marie Curie, Paris, May 2001.

*“The Paris potential and recent LEAR data”*, Technische Universität Kaiserslautern, Kaiserslautern, February 1998.

**Language Knowledge:**

German and French: native fluency (bilingual education). English: fluently spoken, written and read. Spanish: fairly well spoken, written and read. Italian and Portuguese: rudimentary knowledge, ability to read.

**Computer Knowledge:**

Programming experience in Fortran 77/90 using numerical routines and libraries (CERN, NAG, IMSL); Good knowledge of Mathematica, Physica, Reduce, and FORM; good knowledge of the Linux/Unix, MacOS and Windows operating systems.

**Professional References:**

Craig Roberts, Senior Researcher at Argonne National Laboratory (cdroberts@anl.gov)

Willem Kloet, Professor at Rutgers University (kloet@physics.rutgers.edu)

Benoît Loiseau, Senior Researcher at CNRS & Université Pierre et Marie Curie (loiseau@lpnhe.in2p3.fr)

Jean-Pierre Dedonder, Professor and former President of Université Paris-Diderot (dedonder@univ-paris-diderot.fr)

Herbert Neuberger, Professor at Rutgers University (neuberger@physics.rutgers.edu)

Leonard Leśniak, Professor at the Polish Academy of Sciences, Institute for Nuclear Physics (Leonard.Lesniak@ifj.edu.pl)

Tobias Frederico, Professor at Instituto Tecnológico de Aeronáutica, São José dos Campos (tobias@ita.br)

Bachir Moussallam, Senior Researcher at CNRS & Université Paris-Sud (moussall@ipno.in2p3.fr)

Robert Vinh Mau, Professor Emeritus at Université Pierre et Marie Curie (rvinhmau@in2p3.fr)

## Publication List

### Refereed contributions to Journals:

1. *CP violation and kaon-pion interactions in  $B \rightarrow K\pi^+\pi^-$  decays*,  
B. El-Bennich, A. Fuhrman, R. Kamiński, L. Leśniak, B. Loiseau and B. Moussallam,  
Phys. Rev. **D79**, 094005 (2009).
2. *Scalar resonances in a unitary  $\pi\pi$  S-wave model for  $D^+ \rightarrow \pi^+\pi^-\pi^+$* ,  
D. R. Boito, J.-P. Dedonder, B. El-Bennich, O. Leitner and B. Loiseau,  
Phys. Rev. **D79**, 034020 (2009).
3. *Survey of nucleon electromagnetic form factors*,  
I. Cloët, G. Eichmann, B. El-Bennich, T. Klähn and C. D. Roberts,  
Few Body Syst. **46**, 1–36 (2009).
4. *The scalar meson  $f_0(980)$  in heavy-meson decays*,  
B. El-Bennich, O. Leitner, B. Loiseau and J.-P. Dedonder,  
Phys. Rev. **D79**, 076004 (2009).
5. *Paris  $\bar{N}N$  potential constrained by recent antiprotonic-atom data and  $\bar{n}p$  total cross sections*,  
B. El-Bennich, M. Lacombe, B. Loiseau and S. Wycech,  
Phys. Rev. **C79**, 054001 (2009).
6. *Modeling electromagnetic form-factors of light and heavy pseudoscalar mesons*,  
B. El-Bennich, J. P. B. C de Melo, B. Loiseau, J.-P. Dedonder and T. Frederico,  
Braz. J. Phys., vol. 38, no. 3B (2008).
7. *Resonances and weak interactions in  $D^+ \rightarrow \pi^+\pi^-\pi^+$  decays*,  
D. R. Boito, B. El-Bennich, B. Loiseau and O. Leitner,  
Int. J. Mod. Phys. **E16**, 2876-2879 (2007).
8. *Strong and weak interactions in  $B \rightarrow \pi^+\pi^-K$  decays*,  
B. Loiseau, B. El-Bennich, A. Furman, R. Kamiński and L. Leśniak,  
Nucl. Phys. **A790**, 472-476 (2007).
9. *Scalar meson properties from D-meson decays*,  
B. El-Bennich, O. M. A. Leitner, B. Loiseau and J.-P. Dedonder,  
Nucl. Phys. **A790**, 510-513 (2007).
10. *Interference between  $f_0(980)$  and  $\rho(770)^0$  resonances in  $B \rightarrow \pi^+\pi^-K$  decays*,  
B. El-Bennich, A. Furman, R. Kamiński, L. Leśniak and B. Loiseau,  
Phys. Rev. **D74**, 114009 (2006).
11. *Planar versus non-planar  $\bar{N}N$  annihilation into mesons in the light of  $\bar{q}q$  operators and the  $1/N_c$  expansion*,  
B. El-Bennich,  
Phys. Rev. **C72**, 067001 (2005).
12. *Relativistic effects on geometry and angular dependence in the reaction  $\bar{p}p \rightarrow \pi^+\pi^-$* ,  
B. El-Bennich and W.M. Kloet,  
Phys. Rev. **C70**, 034001 (2004).
13. *Relativistic treatment of pion intrinsic wave functions in the annihilation  $\bar{p}p \rightarrow \pi^+\pi^-$* ,  
B. El-Bennich and W.M. Kloet,  
Phys. Rev. **C70**, 034002 (2004).
14. *Annihilation range and final-state interaction in the antiproton-proton annihilation into  $\pi^+\pi^-$* ,  
B. El-Bennich, W.M. Kloet and B. Loiseau,  
Phys. Rev. **C68**, 014003 (2003).
15. *Refining the inner core of the Paris  $\bar{N}N$  potential*,

B. El-Bennich, M. Lacombe, B. Loiseau and R. Vinh Mau,  
Phys. Rev. C**59**, 2313 (1999).

### Unrefereed Contributions, Proceedings:

1. *Pion-kaon interaction effects on CP violation in  $B \rightarrow K\pi^+\pi^-$  decays*,  
B. Loiseau, B. El-Bennich, A. Furman, R. Kaminski, L. Lesniak and B. Moussallam,  
Mod. Phys. Lett. **A24**, 960 (2009).
2. *The ground scalar nonet and D-decays*,  
O. Leitner, B. Loiseau, J. P. Dedonder and B. El-Bennich,  
arXiv:0711.4950 (2007).
3. *Mesonic interactions and their contribution to strong phases in flavor physics*,  
B. El-Bennich, A. Furman, R. Kamiński, L. Leśniak, B. Loiseau and B. Moussallam,  
Proceedings of 11th International Conference on Meson-Nucleon Physics and the Structure of the Nucleon  
(MENU 2007), Jülich, Germany, 10-14 Sep 2007, p. 219. arXiv:0711.2500 (2007).
4. *CP violation and final state interactions in  $B \rightarrow K\pi\pi$  decays*,  
L. Leśniak, B. El-Bennich, A. Furman, R. Kamiński, B. Loiseau and B. Moussallam,  
J. Phys. Conf. Ser. 110:052031 (2008).
5. *Form factors in  $B \rightarrow f_0(980)$  and  $D \rightarrow f_0(980)$  transitions from dispersion relations*,  
B. El-Bennich, O. M. A. Leitner, B. Loiseau and J.-P. Dedonder,  
Int. J. Mod. Phys. **A22**, 641-644 (2007).
6. *Final-state interactions in  $B \rightarrow \pi\pi K$  and  $B \rightarrow K\bar{K}K$  decays*,  
L. Leśniak, B. El-Bennich, A. Furman, R. Kamiński and B. Loiseau,  
Int. J. Mod. Phys. **A22**, 645-648 (2007).
7. *Pseudoscalar-scalar transition form factors in covariant light front dynamics*,  
O. M. A. Leitner, B. El-Bennich, B. Loiseau and J. P. Dedonder,  
in ICHEP 2006, Moscow, pp. 984-987, hep-ph/0609062 (2006).
8. *Lorentz contraction, geometry and range in  $\bar{p}p$  annihilation into two mesons*,  
B. El-Bennich and W.M. Kloet,  
in Low Energy Antiproton Physics (LEAP'05), D. Grzonka *et al.* (Eds.), Melville NY, AIP Conf. Proc.  
79, pp. 35-39 (2005).
9. *The reaction  $\bar{p}p \rightarrow \pi^+\pi^-$ : relativistic aspects and final-state interaction in the pion wave functions*,  
B. El-Bennich, W.M. Kloet and B. Loiseau,  
in *N\*2002*, Physics of Excited Nucleons, pp. 384-388, S.A. Dytman and E.S. Swanson (Eds.), River Edge,  
World Scientific (2003).