

Alexandre Le Tiec

Curriculum Vitæ

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Academic Employment

- 2012–... **MCFP Postdoctoral Fellow**, *Maryland Center for Fundamental Physics, Department of Physics, University of Maryland, College Park MD.*
- 2011–... **JSI Scientist**, *Joint Space-Science Institute, University of Maryland, College Park MD.*
- 2010–2012 **Research Associate**, *Maryland Center for Fundamental Physics, Department of Physics, University of Maryland, College Park MD.*

Education

- 2007–2010 **Ph.D. in Physics**, *Université Pierre et Marie Curie, Paris, France, with highest honors.*
Thesis title: *Coalescing black hole binaries in general relativity & The dark matter problem in astrophysics*; Advisor: Luc Blanchet, Institut d'Astrophysique de Paris
- 2006–2007 **M2 in Astrophysics**, *Observatoire de Paris, France, with highest honors, valedictorian.*
Equivalent to a second-year Master's degree.
- 2005–2006 **Agrégation of Physics**, *École Normale Supérieure de Cachan, France.*
Awarded highest French national teaching certification following competitive exams and year-long intensive preparation.
- 2004–2005 **M1 in Physics**, *Université Pierre et Marie Curie, Paris, France, with high honors.*
Equivalent to a first-year Master's degree.
- 2003–2004 **Licence in Physics**, *Université Pierre et Marie Curie, Paris, France, with high honors.*
Equivalent to a Bachelor's degree.

Research Interests

Gravitational-wave source modeling of inspiralling and coalescing compact binaries
Approximation methods in general relativity: post-Newtonian theory, perturbation theory
The dark matter problem in astrophysics and cosmology, modified gravity

Honors & Awards

- Jan. 2012 Awarded the MCFP Postdoctoral Fellowship.
- May 2011 Nominated as a Joint Space-Science Institute Scientist.
- Feb. 2010 Nominated then selected to participate to the 60th Lindau Meeting of Nobel Laureates.
- 2007–2010 Three-year long fellowship from the French government as a doctoral student.

2003–2007 Four-year long fellowship from the French government as a student of the École Normale Supérieure de Cachan (admitted following national competitive entrance exams).

Publication List

Submitted for Publication

11. *Spacetime symmetries and Kepler's third law*,
A. Le Tiec,
Submitted to Am. J. Phys. (2012), arXiv:1202.2893 [gr-qc]

Peer-Reviewed Publications

10. *Complete nonspinning effective-one-body metric at linear order in the mass ratio*,
E. Barausse, A. Buonanno & A. Le Tiec,
Phys. Rev. D **85**, 064010 (2012), arXiv:1111.5610 [gr-qc]
9. *Gravitational self-force correction to the binding energy of compact binary systems*,
A. Le Tiec, E. Barausse & A. Buonanno,
Phys. Rev. Lett. **108**, 131103 (2012), arXiv:1111.5609 [gr-qc]
8. *First law of binary black hole mechanics in general relativity and post-Newtonian theory*,
A. Le Tiec, L. Blanchet & B. F. Whiting,
Phys. Rev. D **85**, 064039 (2012), arXiv:1111.5378 [gr-qc]
7. *Periastron advance in black-hole binaries*,
A. Le Tiec, A. H. Mroué, L. Barack, A. Buonanno, H. P. Pfeiffer, N. Sago & A. Taracchini,
Phys. Rev. Lett. **107**, 141101 (2011), arXiv:1106.3279 [gr-qc]
6. *High-order post-Newtonian fit of the gravitational self-force for circular orbits in the Schwarzschild geometry*,
L. Blanchet, S. Detweiler, A. Le Tiec & B. F. Whiting,
Phys. Rev. D **81**, 084033 (2010), arXiv:1002.0726 [gr-qc]
5. *The gravitational-wave recoil from the ringdown phase of coalescing black hole binaries*,
A. Le Tiec, L. Blanchet & C. M. Will,
Class. Quant. Grav. **27**, 012001 (2010), arXiv:0910.4594 [gr-qc]
4. *The close-limit approximation for black hole binaries with post-Newtonian initial conditions*,
A. Le Tiec & L. Blanchet,
Class. Quant. Grav. **27**, 045008 (2010), arXiv:0910.4593 [gr-qc]
3. *Post-Newtonian and numerical calculations of the gravitational self-force for circular orbits in the Schwarzschild geometry*,
L. Blanchet, S. Detweiler, A. Le Tiec & B. F. Whiting,
Phys. Rev. D **81**, 064004 (2010), arXiv:0910.0207 [gr-qc]
2. *Dipolar dark matter and dark energy*,
L. Blanchet & A. Le Tiec,
Phys. Rev. D **80**, 023524 (2009), arXiv:0901.3114 [astro-ph.CO]
1. *Model of dark matter and dark energy based on gravitational polarization*,
L. Blanchet & A. Le Tiec,
Phys. Rev. D **78**, 024031 (2008), arXiv:0804.3518 [astro-ph]

Chapters in Books

1. *High-accuracy comparison between the post-Newtonian and self-force dynamics of black-hole binaries*,
L. Blanchet, S. Detweiler, A. Le Tiec & B. F. Whiting,
In *Mass and Motion in General Relativity* (L. Blanchet, A. Spallicci & B. Whiting Eds.),
Fundamental Theories of Physics, Vol. 162, Springer (2011), arXiv:1007.2614 [gr-qc]

Conference Proceedings

2. *Perturbative, post-Newtonian, and general relativistic dynamics of black hole binaries*,
A. Le Tiec,
Proceedings of the “46^e rencontres de Moriond & GPhyS colloquium” (J. Dumarchez & J. Trân Thanh Vân Eds.), The Gioi Publishers (2011), arXiv:1109.6848 [gr-qc]
1. *Phenomenology of the modified Newtonian dynamics and the concordance cosmological scenario*,
L. Blanchet & A. Le Tiec,
Proceedings of the “43^e rencontres de Moriond” (J. Dumarchez, Y. Giraud-Héraud & J. Trân Thanh Vân Eds.), The Gioi Publishers, p. 257 (2009), arXiv:0807.1200 [astro-ph]

Presentations

Invited Conference Talks and Seminars

- Apr. 2012 **APS April Meeting 2012**, Hyatt Hotel, Atlanta GA, USA.
The overlap of numerical relativity, perturbation theory and post-Newtonian theory in the binary black hole problem.
- Dec. 2011 **Gravity Theory Seminar**, University of Maryland, College Park MD, USA.
The first law of binary black hole mechanics.
- Sept. 2011 **JSI Mini-Symposium**, University of Maryland, College Park MD, USA.
Periastron advance in black hole binaries.
- July 2011 **14th Capra Meeting on Radiation Reaction**, University of Southampton, UK.
The gravitational self-force: Comparisons with post-Newtonian theory.
- Apr. 2011 **Theoretical Astrophysics Seminar**, University of Florida, Gainesville FL, USA.
Exploring the relativistic dynamics of coalescing black hole binaries.
- Mar. 2011 **46th Rencontres de Moriond & GPhyS Colloquium**, Planibel Hotel, La Thuile, Italy.
Perturbative, post-Newtonian, and general relativistic dynamics of black hole binaries.
- June 2010 **13th Capra Meeting on Radiation Reaction**, Perimeter Institute, Waterloo, Canada.
The gravitational self-force: Comparisons with post-Newtonian theory.
- Oct. 2009 **General Relativity Group Seminar**, University of Southampton, UK.
Post-Newtonian calculation of the gravitational self-force for black hole binaries.

Other Conference Talks and Seminars

- Nov. 2011 **2011 JSI Workshop**, Loews Annapolis Hotel, Annapolis MD, USA.
Dipolar dark matter as an alternative to cold dark matter.
- Oct. 2011 **GRITTS Seminar**, Massachusetts Institute of Technology, Cambridge MA, USA.
Exploring the relativistic dynamics of coalescing black hole binaries.

- July 2011 **14th Capra Meeting on Radiation Reaction**, University of Southampton, UK.
Periastron advance in black hole binaries.
- May 2011 **TAPIR Seminar**, California Institute of Technology, Pasadena CA, USA.
Exploring the relativistic dynamics of coalescing black hole binaries.
- May 2011 **APS April Meeting 2011**, Hyatt Hotel, Garden Grove CA, USA.
Periastron advance in black hole binaries.
- Mar. 2011 **GReCO Seminar**, Institut d'Astrophysique de Paris, France.
Perturbative, post-Newtonian, and general relativistic dynamics of black hole binaries.
- Feb. 2010 **Theory Group Seminar**, APC Laboratory, Paris, France.
Comparing and combining post-Newtonian methods with black hole perturbations.
- Feb. 2010 **LUTH Seminar**, Observatoire de Meudon, France.
Comparing and combining post-Newtonian methods with black hole perturbations.
- Jan. 2010 **Numerical Relativity Group Seminar**, Albert Einstein Institute, Golm, Germany.
Comparing and combining post-Newtonian methods with black hole perturbations.
- Dec. 2009 **Elbereth 2009 Conference**, Institut d'Astrophysique de Paris, France.
Gravitational recoil of coalescing binary black holes.
- July 2009 **12th Marcel Grossmann Meeting**, Palais de l'UNESCO, Paris, France.
Post-Newtonian calculation of the gravitational self-force for black hole binaries.
- July 2009 **Invisible Universe International Conference**, Palais de l'UNESCO, Paris, France.
Dipolar dark matter and dark energy.
- June 2009 **12th Capra Meeting on Radiation Reaction**, Indiana Univ., Bloomington IN, USA.
Post-Newtonian calculation of the gravitational self-force for black hole binaries.
- June 2009 **Gravity Theory Seminar**, University of Maryland, College Park MD, USA.
Post-Newtonian calculation of the gravitational self-force for black hole binaries.
- Apr. 2009 **Interactions in the Dark Workshop**, Lorentz Center, Leiden, The Netherlands.
Dipolar dark matter and dark energy.
- Feb. 2009 **LISA France 2009 Meeting**, Institut d'Astrophysique de Paris, France.
Post-Newtonian calculation of the self-force for black hole binaries.
- Dec. 2008 **Elbereth 2008 Conference**, Institut d'Astrophysique de Paris, France.
Comparison of third post-Newtonian and self-force calculations for extreme mass ratio black hole binaries.
- Sept. 2008 **LUTH Seminar**, Observatoire de Meudon, France.
Model of dark matter and dark energy based on gravitational polarization.
- Apr. 2008 **GReCO Seminar**, Institut d'Astrophysique de Paris, France.
Model of dark matter and dark energy based on gravitational polarization.

Teaching Experience

- 2009–2010 **Graduate Teaching Assistant**, Université Pierre et Marie Curie, Paris.
- Taught a section of a class entitled “Cosmology” for graduate students (12 hours).
 - Taught a section of a class entitled “Optics and Electromagnetism” for third-year undergraduate students (22 hours).
 - Taught a section of a class entitled “Mathematics for physicists” for second-year undergraduate students (38 hours).

- 2008–2009 **Graduate Teaching Assistant**, *Université Pierre et Marie Curie*, Paris.
Taught a section of a class entitled “Introduction to physics” for first-year undergraduate students (68 hours).
- 2006–2008 **Exam Instructor in Classes Préparatoires**, *Lycée Lavoisier*, Paris.
Designed, supervised and corrected simulated tests for competitive exams for students attempting to enter French “Grandes Écoles” (60 hours).
- 2006–2007 **Exam Instructor in Classes Préparatoires**, *Lycée Corot*, Savigny-sur-Orge.
Designed, supervised and corrected simulated tests for competitive exams for students attempting to enter French “Grandes Écoles” (60 hours).
- 2005–2006 **Agrégation of Physics**, *École Normale Supérieure de Cachan*, Cachan.
Year-long intensive preparation of the competitive exams to be awarded the highest French national teaching certification.
- 2004–2005 **Teaching Internship**, *Lycée Marie Curie*, Sceaux.
Weekly preparation and instruction of physics classes to high school students.
- 2003–2004 **Volunteer Tutoring**, *Social Services of Cachan*, Cachan.
Assisted middle-school students with homework for three hours a week.

Public Outreach

- Dec. 2009 Gave two one-hour introductory lectures on astronomy to elementary school children during the “Fête de la Science”, the French national week celebrating science.
- July 2009 Interviewed on my doctoral research for the webcast “Radio Thésards”, whose website is <http://droitdecites.net/category/ateliers/radio-thesards-David-Christoffel>
- Dec. 2007 Helped organize and run the public outreach segment of the “Fête de la Science” at the Institut d’Astrophysique de Paris.

Languages

Native speaker	French
Fluent	English
Intermediate	Spanish

Computer Skills

Programming	Fortran 95, C, basics in parallel computing (OpenMP, MPI)
Comp. Algebra	Mathematica, Maple

References

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