

Sophie (Marie, Véronique) PIREAUX,

Post-Doctorate in Theoretical Physics and Astronomy-Astrophysics

12 Brikstraat, 1541 Sint Pieters Kapelle, BELGIUM

office:++32(0)373 67 53, mobile: ++32(0)488/40 97 78

sophie.pireaux@oma.be

http://sophie.pireaux.perso.neuf.fr/public_html/page_web_perso_boulot/index.html

Born in Namur (Belgium),

10th July 1974.

Belgian, married

EDUCATION/DIPLOMAS

- September 2002-
September 1998** **Physics Doctorate/ research assistant/ UCL (LLN, Belgium) doctoral school, “Plus Grande Distinction”**
Research domain/ “Light deflection experiments as a test of relativistic theories of gravitation.”
Title of the thesis:
Thesis advisor: Professor J-M. Gérard (FYMA)
Jury members: Professors J-P. Antoine (UCL, Belgium), J-M. Gérard (UCL, Belgium), J. Weyers (UCL, Belgium), J. Govaerts (UCL, Belgium), J. Surdej (Ulg, Belgium), F. Mignard (OCA, France)
- September 1998-
September 1997** **Diplôme d’Etudes Approfondies (DEA= Master) in physics, UCL (LLN, Belgium), 87.5%**
Research domain/ “Etude de la déflexion de la lumière comme test d’une théorie de la gravitation/
Title of the thesis: Study of light deflection as a test to an alternative theory of gravitation.”
Advisor: Professor J-M. Gérard (FYMA)
- September 1997-
September 1995** **Graduate university diploma in physics, UCL (LLN, Belgium), “Plus Grande Distinction”**
Title of the thesis: “Etude de solutions particulières d’une théorie invariante conforme de la gravitation /
Particular solutions to a conformally invariant theory of gravitation.”
Advisor: Professor J-M. Gérard (FYMA)
- September 1995-
September 1993** **Undergraduate university diploma in physics, FUNDP (Namur, Belgium), “Plus Grande Distinction”**

PROFESSIONAL EXPERIENCE

- **Research on GPS time transfer et publications** (see annex 2) : Ionospheric effets.
Collaborators: P. Defraigne, N. Bergeot, C. Bruyninx (ORB), participating to STCE (Solar and Terrestrial Centre of Excellence)
Place: Reference Systems and Geodynamics Department, Royal Observatory of Belgium (ORB),
3 avenue Circulaire, 1180 Brussels, Belgium
CDD: contract STCE Royal Observatory of Belgium.
Period: 15th September 2007- 14th August 2009.
- **Research in Gravitational Relativistic effects and publications** (see annex 2) :
Spin orbit coupling and solar astrodynamics;
Light transfer and orbitography for LISA in a General Relativistic framework, participating to LISACode (a LISA simulator).
Collaborators: J-P. Rozelot (GEMINI, OCA), B. Chauvineau, T. Regimbau, J-Y. Vinet (ARTEMIS, OCA), participating to LISAFRANCE
Place: UMR6203 GEMINI/ UMR6162 ARTEMIS, Observatoire de la Côte d’Azur (OCA),
Avenue Copernic, 06130 Grasse, France
Temporary position: contract Observatoire de la Côte d’Azur;
CNES Post-Doctorate: contract convention CNES-INSU 02/CNES/282.
Period: 1st January 2007- 31st January 2007; 1st January 2005- 31st December 2006.
- **Research in Space Geodesy and publications** (see annex 2) : Development of the basis of a native relativistic orbitography software.
Collaborators: J-P. Barriot (DTP, OMP), P. Rosenblatt (ORB), participating to MAGE (MArs Geophysical European Network)
Place: UMR5562: Dynamique Terrestre et Planétaire (DTP), Observatoire Midi-Pyrénées (OMP),
14 Avenue Edouard Belin, 31400 Toulouse, France
CNRS Post-Doctorate on exterior European funds: Contract PRN CT-2002-00217, European Research Training Network;
Assistant INSU/CNRS.
Period: 1st January 2003- 31st December 2004; 15th November 2002- 31st December 2002.
- **Research in Fundamental Physics and publications** (see annex 2) : gravitational theories, cosmology, astrophysics.
Advisor: Professor J-M. Gérard (FYMA, UCL)
Place: Unité de Physique Théorique et Mathématique (FYMA), Université catholique de Louvain (UCL),
2 chemin du Cyclotron, 1348 Louvain la Neuve, Belgium
UCL researcher on exterior funds -Fond National pour la Recherche Scientifique (FNRS)-: IISN Contract, convention n°4.4509.86.
Period: 1st September 1997- 30th September 2002.
- **Work in a foreign research lab:** plasma physics.
Place: Weizmann Institute of Sciences
Rehovot, Israel
Scholarship: Competition: Weizmann International Summer Sciences Institute.
Period: 8th July -7th August 1992.

- **Funding search:** scholarships (see annex 3).
- **Scientific distinctions** (see annex 3); **member** of the “International Society on General Relativity and Gravitation” and of the “Groupe de Recherche en Géodésie Spatiale” (GRGS, France)
- **Development of research contacts at the national/international level:**
Main professional contacts with UCL, ULB, ORB, Ulg (Belgium); OCA, OMP, APC, Observatoire de Paris, CNES (France); JPL NASA (USA); IAARAS (Russia).
Participation to numerous schools/ seminars/ international conferences (see annex 1).
Regular scientific communications, internal, national or international (see annexes 1 and 2).
- **Teaching** (see annex 4):
Technical lectures (14/01/04,04/05/07): Centre de Compétence Technique (CCT) du CNES, Toulouse, FRANCE.
Lectures (30th August 2004- 3rd September 2004): Groupe de Recherche en Géodésie Spatiale (GRGS) summer school, Forcalquier, FRANCE, “Space Geodesy, Physics Measurements and Fundamental Physics”.
Exercises/Tutorials (1st September 1997- 30th September 2002): analytical mechanics to undergraduate students in math/physics; classical mechanics, electromagnetism to engineers; general relativity, tensor calculus to physics graduate students.
Practical work in labs (1st Septembre 1997- 30th September 2002): electromagnetism, waves to undergraduate engineers.
Private lectures (since 1997) in math and physics.

COMPUTER SKILLS

- Working experience with Linux and Windows **operating Systems**.
- **Office automation, productivity tools / scientific softwares:** Word, Powerpoint, Excel, Acrobat, Dreamweaver, Xemacs, Scientific Word, latex, Maple, Photoshop, Saoimage.
- **Programming languages:** Fortran, Pascal, notions of C++.

COMMUNICATION SKILLS

- **Languages:**
French: mother tongue
English: fluent in speaking, reading and writing (Rotary Exchange Student in the USA 1992-1993, professional language).
Dutch: presently refreshing it by classes.
German: notions.
Spanish: notions.
- **Seminars, research reports and conferences given in English/ French** (see annexes 1 and 2)
- **Writing synthesis/technical articles, lecture notes** for physics graduates or post-doctorates, *reports, posters* (see annex 2).
- **Vulgarization** (other than assistantship):
 - “*Sciences Festival -UCL*”, springs 2000, 2001. Conceiving a modulus on “Gravitational Mirages” for *senior high-school students*. Seminars and demonstrations: plexiglass lenses were designed specifically for the occasion and shaped to mimic the gravitational deflection of light around a black hole, a spiral galaxy...
 - Adib Astronomical Society, Isfahan, IRAN, 2nd February 1999. Seminar on mirages and gravitational lenses for *amateur astronomers*.
- **Multimedia:** writing and shaping several *webpages* (AMS team, www.obs-azur.fr/gemini/ams.html).

SPECIFICS SKILLS IN PHYSICS

- **Optics:** modelization of didactical plexiglass lenses in order to mimic gravitational light deflection around different gravitational bodies (black holes...).
- **Space missions:** comparative study of past, present and future satellite projects or interferometers (ex: Hipparcos, DIVA, SIM, GAIA, LISA, LATOR, VLBI II, MICROSCOPE...) and of their specificities to test alternative theories of gravitation.
- **Models:**
 - *Time transfer and ionosphere:* ionospheric corrections on GNSS signals (GPS, GALILEO)
 - *RELATIVISTIC laser links, time transfer and orbitography:* numerical and analytical models for space missions (LISA, GALILEO, GPS, planetary orbiter)
 - *gravitation theories:* General Relativity, scalar-tensor theories, Large Extra Dimensions, Weyl theory
 - *RELATIVISTIC reference frames and space-time coordinate transformations*
 - *(Post-)Post Newtonian Parameters formalism*
 - *cosmological evolution*
 - *gravitational lenses and light deflection*
 - *field theory and standard model of interactions*

- **27 April-1st May 2009:** “IAU Symposium 261: Relativity in Fundamental Astronomy: Dynamics, Reference Frames, and Data Analysis.”, VIRGINIA BEACH, USA.
Oral presentation and publication in the proceedings: “Relativistic orbit model for the LISA mission”.
- **21st-24th April 2009:** “EFTF09 (European Time and Frequency Transfer Meeting)”, Besancon, FRANCE.
Oral presentation and publication in the proceedings: “Higher-order ionosphere perturbations in GPS time and frequency transfer”, Session Improvement of Time Scales and Time Transfer.
- **1st-4th December 2008:** “PTTI 2008 (Precise Time and Time Interval Systems and Applications Meeting)”, Reston, Virginia, USA.
Oral presentation and publication in the proceedings: “Ionosphere perturbations in GPS time and frequency transfer”, Session 10: Time and Frequency transfer.
- **17th-21st November 2008:** “ESWW 2008 (5th European Space Weather Week)”, Brussels, BELGIUM.
Two poster presentations: “Ionosphere perturbations in GPS time and frequency transfer” S. Pireaux, P. Defraigne, N. Bergeot, Q. Baire, C. Bruyninx; “Impact of a geomagnetic superstorm on Kinematic GPS Positioning”, N. Bergeot, C. Bruyninx, S. Pireaux, P. Defraigne, J. Legrand, E. Pottiaux; Session 2: Global Navigation Satellite Systems: Science, user needs and applications.
- **30th June 2008:** *Invited lecturer* “Space Geodesy, Celestial Mechanics and Tests of General Relativity.”, ASTR, Université Catholique de Louvain, Louvain la Neuve, BELGIUM.
- **17th-20th June 2008:** “EUREF 2008 (Reference Frame sub-Commission for Europe)”, Brussels, BELGIUM.
Participation to a poster and publication in the proceedings: “Detection of abnormal ionospheric activity from the EPN and impact on Kinematic GPS Positioning”, N. Bergeot, C. Bruyninx, E. Pottiaux, S. Pireaux, P. Defraigne, J. Legrand; Session 3: Systematic errors in GNSS.
- **23rd-25th April 2008:** “EFTF 2008 (22nd European Frequency and Time Forum)”, Toulouse, FRANCE.
Oral presentation and publication in the proceedings: “Time Delay Interferometry and Time Scales in the LISA mission”, E5b Session: Time scale.
- **5th-9th November 2007:** “4th European Space Weather Week”, Brussels, BELGIUM.
- **1st-4th October 2007:** “1st Colloquium on Scientific and Fundamental Aspects of the Galileo Programme”, Toulouse, FRANCE.
- **27th February 2007:** *Invited lecturer* “Numerical relativistic versus classical orbitography for LISA.”, “Séminaire d’Astrophysique”, Observatoire de la Côte d’Azur, Nice, FRANCE.
- **1-2 February 2007:** “4th LISA FRANCE meeting”, Annecy, FRANCE.
Oral presentation: “Numerical relativistic orbitography for LISA”, S. Pireaux, B. Chauvineau.
- **14-25th August 2006:** IAU XXVIth General Assembly, Prague, Czech Republic *Invited lecturer* “Relativity and Space Geodesy”, IAU Commission 31: Time and Astronomy.
Oral presentations and publication in the proceedings: “Solar quadrupole moment from planetary ephemerides: present state of the art”, JD16 Session: Nomenclature, Precession and New models in Fundamental Astronomy.
- **15-16 May 2006:** “3rd LISA FRANCE meeting”, Meudon, FRANCE.
Oral presentation: “Transfert de temps dans l’espace: Etude relativiste. Application à la mission LISA”, S. Pireaux, B. Chauvineau.
- **23rd March 2006:** *Invited lecturer* “Simulating the LISA - Laser Interferometer Space Antenna - Mission. Relevance of the gravitational relativistic effects.”, APC, Paris 7 University, Paris, FRANCE.
- **17th March 2006:** *Invited lecturer* “An outlook on the estimate of the solar quadrupole moment from planetary ephemerides.”, Lille 1 University, Lille, FRANCE.
- **13th December 2005:** *Invited lecturer* “Study of the gravitational relativistic effects in the LISA mission.” “Séminaires Astronomie et Astrophysique”, Observatoire de la Côte d’Azur, Nice, FRANCE.
- **12th-14th October 2005:** *Invited lecturer* “Relativistic analysis of laser links in the LISA mission”, “Les Journées du GREX - Groupe de Recherche en Gravitation et Expérience dans l’Espace - 2005”, CNES, Paris, FRANCE.
- **5th-6th October 2005:** “2nd LISA FRANCE meeting”, Nice, FRANCE.
Oral presentation: “Relativistic analysis of the LISA mission”, S. Pireaux, B. Chauvineau, T. Regimbau, J-Y. Vinet.
- **29th-30th September 2005:** “Journées Jeunes Chercheurs”, CNES, Toulouse, FRANCE.
Oral and poster presentations:
 “Gravitational relativistic effects in the LISA mission, development of a simulator.”
 “Spin orbit coupling and solar astrodynamics in a relativistic framework.”
- **27th June-1st July 2005:** “Les journées SF2A”, Strasbourg, FRANCE.
Oral, poster presentations and publication in the proceedings:
 “On the key role of a dynamical estimate of the solar spin and gravitational multipole moments.”
 “Solar gravitational moments and solar core dynamics.”
- **9th June 2005:** *Invited lecturer* “Modèle d’évolution cosmologique simple pour une Théorie Tenseur Scalaire. Contraintes résultantes sur le couplage scalaire et conséquences en matière de déflexion de la lumière.” “Séminaires du labo de Physique Atomique et Cosmologie”, Université de Grenoble, FRANCE.
- **22nd April 2005:** *Invited lecturer* “Approche relativiste native en gravitation. Application à des projets spatiaux”. “Séminaires Astroparticules et Cosmologie”, Université Paris 7, FRANCE.
- **1st April 2005:** *Invited lecturer* “Modèle d’évolution cosmologique simple pour une Théorie Tenseur Scalaire. Contraintes résultantes sur le couplage scalaire et conséquences en matière de déflexion de la lumière.” “Séminaires réguliers du groupe Interactions fondamentales, CPT LUMINY”, Université Marseille 1, FRANCE.

- **21-25th March 2005:** CNRS School, “Nouvelles techniques d’observation et bases de données: apports en astrométrie et mécanique céleste”, Vars, FRANCE.
- **19th-20th January 2005:** “1st LISA FRANCE meeting”, APC, Paris, FRANCE.
- **27th-29th October 2004:** *Invited lecturer* “Light deflection in Weyl gravity”, “Les Journées du GREX - Groupe de Recherche en Gravitation et Expérience dans l’Espace - 2004”, OCA, FRANCE.
- **4th-8th October 2004:** “55th International Astronautical Congress”, Vancouver, CANADA.
Oral presentation: “(SC)RMI: A (Semi Classical) Relativistic Motion Integrator, to model the orbits of space probes around the Earth and other planets”.
- **20th-22th September 2004:** “Les Journées 2004 des Systèmes de Référence”, Observatoire de Paris, FRANCE.
Poster presentation and publication in the proceedings: “Relativistic modeling of the orbit of geodetic satellites equipped with accelerometers”.
- **30th August-3rd September 2004:** Ecole d’été du Groupe de Recherche en Géodésie Spatiale, “Géodésie Spatiale, physique de la mesure et physique fondamentale”, Forcalquier, FRANCE.
- **25th June 2004:** *Invited lecturer* “RMI approach: Integrating the motion of geodetic satellites in a coherent relativistic framework.”, NEIGE meeting, Brussels Royal Observatory, BELGIUM.
- **6th April 2004:** *Invited lecturer* “Light deflection in Weyl gravity”, ARTEMIS seminars, OCA, FRANCE.
- **11th March 2004:** *Invited lecturer* “Solar quadrupole moment and purely relativistic contributions to Mercury’s perihelion advance”, Séminaire d’Astrophysique, CESR-LAT Toulouse, FRANCE.
- **5th March 2004:** *Invited lecturer* “Moment quadrupolaire versus contribution gravitationnelle purement relativiste au mouvement orbital des planètes”, Séminaire Temps-Espace (SYRTE-IMCCE), Observatoire de Paris, FRANCE.
- **18th December 2003:** *Invited lecturer* “Relativity and time transformations: an operational point of view”, UCL, BELGIUM.
- **26th-27th November 2003:** “Relativity Reference Frame Working Group. 4th meeting”, Nice, FRANCE.
- **23rd-24th November 2003:** “Journées Bordelaises. 1ère réunion: Soleil, Mercure et Relativité Générale”, Bordeaux, FRANCE.
- **8th-10th October 2003:** “Les Journées du GREX - Groupe de Recherche en Gravitation et Expérience dans l’Espace - 2003”, Observatoire et Institut d’Astrophysique de Paris, FRANCE.
- **22nd-25th September 2003:** “Les Journées 2003 Systèmes de Référence: Astrometry, geodynamics and Solar System dynamics: from milliarcseconds to microarcseconds”, St. Petersburg, RUSSIA.
Poster presentation and publication in the proceedings: “Development of the basis of a native relativistic orbitography software”.
- **12nd-23rd June 2003:** “Relativity Reference Frame Working Group. 3rd meeting”, Dresden, GERMANY.
- **28th April-9th May 2003:** “Workshop: Planet Mars.”, Les Houches, FRANCE.
- **26th May 2003:** *Invited lecturer* “Solar quadrupole moment and purely relativistic gravitation contributions to Mercury’s perihelion advance - update”, CERGA, OCA, FRANCE.
- **20th January 2003:** *Invited lecturer* “Light deflection experiments as a test of relativistic theories of gravitation”, OMP, FRANCE.
- **30th October 2001:** *Invited lecturer* “Solar quadrupole moment and purely relativistic gravitation contributions to Mercury’s perihelion advance”, Ulg, BELGIUM.
- **20th-21st October 2001:** Francqui Conference 2001. “Strings and gravity: Tying the forces together”, Bruxelles, BELGIUM.
- **15th-21st July 2001:** “16th International Conference of the International Society on General Relativity and Gravitation”, GR16 Durban, AFRIQUE DU SUD.
Poster presentation: “Cosmological evolutionary model for a scalar tensor theory: a confrontation between its predictions regarding light deflection and the present/future technological developments allowing to test this effect”.
- **6th-11th August 2000:** International Astronomical Union (I.A.U.) 24th General Assembly: Symposium S201 “Cosmological Parameters”, Manchester, ENGLAND.
- **5th-16th Decembre 1999:** International School of Astrophysics: D. Chalonge 7th course: “Current topics in Astrofundamental Physics”, Ettore Majorana Foundation and Center for Scientific Culture, Erice, SICILE.
- **25th-30th July 1999:** “Gravitational Lensing: Recent Progress and Future Goals”, Boston University, MA, USA.
- **2nd February 1999:** *Invited lecturer* “Light deflection and gravitational mirages in the setting of General Relativity”, Meeting of amateur astronomers, Adib Astronomical Society, Isfahan, IRAN.
- **23rd January-4th February 1999:** IPM School on Cosmology 99: “Large scale structure formation”, Kish University, IRAN.
Oral presentation: “Light deflection as a powerful test to alternative theories of gravitation”.
- **29th March-4th April 1998:** ISMC 98: “International Seminar on Mathematical Cosmology”, University of Potsdam, GERMANY.
- **8th July-7 August 92:** Scholarship for the “Dr. Bessie F. Lawrence 24th Summer Science Institute”, Weizmann Institute of Sciences, Rehovot, ISRAEL.
Work in a research lab on plasma physics leading to a oral report and an article: “Spectroscopy Analysis of Intensity, Thermal and Radial Velocities of the OIV in Z-Pinch Plasma”.

- **Publications in preparation**

- “An outlook on the estimate of the solar quadrupole moment from planetary ephemeris”, S. Pireaux, E.M. Standish and J-P. Rozelot, in preparation for *Celestial Mechanics*.
- “Non-gravitational forces and the relativistic equation of motion”, S. Pireaux and J-P. Barriot, in preparation for *Celestial Mechanics*.
- “A simple cosmological evolutionary model for Tensor Scalar Theories. Resulting constraints on the scalar coupling.”, S. Pireaux and J-M. Gérard, in preparation for *Classical and Quantum Gravity*.

- **Publications in journals with referees: international level**

- “Higher-order ionosphere perturbations in GPS time and frequency transfer”, S. Pireaux, P. Defraigne, L. Wauters, N. Bergeot, Q. Baire, C. Bruyninx, **submitted** to *GPS Solutions*, July 2009.
- “Influence of ionosphere perturbations in GPS time and frequency transfer”, S. Pireaux, P. Defraigne, L. Wauters, N. Bergeot, Q. Baire, C. Bruyninx, **accepted** in *Advance in Space Research*, Special Issue “Recent Advances in Space Weather Monitoring”, July 2009; DOI: 10.1016/j.asr.2009.07.011.
- “Relativistic versus Newtonian orbit model: the Relativistic Motion Integrator (RMI) software, illustration with the LISA mission”, S. Pireaux, B. Chauvineau and A. Hees, **submitted** to *Celestial Mechanics*, July 2009; arXiv: 0801.3637v2(gr-qc).
- “LISACode: A scientific simulator of LISA”, A. Petiteau, G. Auger, H. Halloin, O. Jeannin, S. Pireaux, E. Plagnol, T. Regimbau, and J-Y. Vinet, *Physical Review D*, 77023002, 2008.
- “Time scales in LISA”, S. Pireaux, *Classical and Quantum Gravity*, 24, 2271-2281, 2007; gr-qc/0703119.
- “Shapiro delay of asteroids on LISA”, B. Chauvineau, S. Pireaux and T. Regimbau, *Classical and Quantum Gravity*, 24, 3005-3011, 2007.
- “Relativistic analysis of the LISA long range optical links”, B. Chauvineau, S. Pireaux, T. Regimbau and J-Y. Vinet, *Physical Review D*, 72, 122003, 2005; gr-qc/0511157.
- “Solar gravitational energy and luminosity variations”, Z. Fazel, J-P. Rozelot, S. Lefebvre, A. Ajabshirizadeh and S. Pireaux, *New Astronomy*, 13/2, 65-72, 2008; arXiv:0909.0194v1 [astro-ph.SR].
- “SCRMI: a Semi-Classical Relativistic Motion Integrator, to model the orbits of space probes around the Earth and other planets”, S. Pireaux, J-P. Barriot and P. Rosenblatt, *Acta Astronautica*, 59, 517-523, 2006; gr-qc/0602008.
- “Are non-magnetic mechanisms such as temporal solar diameter variations conceivable for an irradiance variability?”, J-P. Rozelot, S. Lefebvre, S. Pireaux and A. Ajabshirizadeh, *Solar Physics*, 224, 229-235, 2004; astro-ph/0601109 v1.
- “Light deflection in Weyl gravity: critical distances for photon paths”, S. Pireaux; *Classical and Quantum Gravity*, 21, 1897-1913, 2004; gr-qc/0403071.
- “Light deflection in Weyl gravity: constraints on the linear parameter”, S. Pireaux, *Classical and Quantum Gravity*, 21, 4317-4333, 2004; gr-qc/0408024.
- “Solar Quadrupole Moment and Purely Relativistic Gravitation Contributions to Mercury’s Perihelion Advance”, S. Pireaux and J-P. Rozelot, *Astrophysics and Space Sciences* 284: 1159-1194, 2003; astro-ph/0109032.

- **Lecture notes**

- Workshops organized by the “Centre de Compétence Technique: Mécanique Orbitale”, CNES, FRANCE:
 - “Relativistic Motion Integrator: a modern general relativistic approach to orbitography. Illustration with the space mission LISA”, S. Pireaux, 4th May 2007;
 - “A general relativistic methodology for laser links (computing photon time transfer in the setting of General Relativity). Illustration with the space mission LISA”, S. Pireaux, 4th May 2007;
 - “Relativity and time transformations: an operational point of view”, S. Pireaux, 14th January 2004;
- Ecole d’été du Groupe de Recherche en Géodésie Spatiale (GRGS), 30th August - 3rd September 2004, Forcalquier, FRANCE:
 - “Key tools for relativistic gravitational effects”, S. Pireaux;
 - “Introduction to relativistic celestial mechanics”, S. Pireaux;
 - “Geodesy and tests of relativistic theories of gravitation”, S. Pireaux.
- Collaboration with M. Beuthe to the redaction of a syllabus of exercises for the course on general relativity PHYS 2143, UCL, in 1998.

- **Communication summaries and posters presented to conferences or scientific society meetings: international level**

- “Using the EUREF Permanent Network to Monitor the Ionosphere”, N. Bergeot, C. Bruyninx, S. Pireaux, P. Defraigne, J. Legrand, Q. Baire, E. Pottiaux, EUREF Annual Symposium, 26th-30th August 2009, Florence, ITALY.
- “A relativistic orbit model for the LISA mission to be used in TDI simulators”, S. Pireaux, B. Chauvineau, IAU Symposium 261: Relativity in Fundamental Astronomy: Dynamics, Reference Frames, and Data Analysis, 27th April-1st May 2009, VIRGINIA BEACH, USA.
- “A relativistic Motion Integrator: Numerical accuracy and illustration with BepiColombo and Mars NEXT”, A. Hees, S. Pireaux, IAU Symposium 261: Relativity in Fundamental Astronomy: Dynamics, Reference Frames, and Data Analysis, 27th April-1st May 2009, VIRGINIA BEACH, USA.
- “Higher-order ionosphere perturbations in GPS time and frequency transfer”, S. Pireaux, P. Defraigne, L. Wauters, N. Bergeot, Q. Baire, C. Bruyninx, Session “Improvement of Time Scales and Time Transfer”, EFTF09, 21st-24th April 2009, Besancon, FRANCE, <http://www.eftf.org/proceeding/index.html>.
- “Vertical Total Electron Content Maps over Europe from EUREF”, N. Bergeot, C. Bruyninx, S. Pireaux, P. Defraigne, J. Legrand, Q. Baire, E. Pottiaux, Section “Geodesy”, Session G5 “Monitoring the lower atmosphere and ionosphere by space geodetic techniques”, EGU General Assembly, 19th-24th April 2009, Vienna, AUSTRIA; EGU2009-5654.
- “Detection of ionospheric scintillations and impact on GPS kinematic positioning”, N. Bergeot, C. Bruyninx, S. Pireaux, P. Defraigne, J. Legrand, E. Pottiaux, Section “Geodesy”, Session “Synergy Between GNSS/GPS Observation Systems and Climate, Meteorological, and Ionospheric Applications”, AGU Fall meeting, 15th-19th December 2008, San-Francisco, USA; G41A-0619.
- “Influence of ionosphere perturbations in GPS time and frequency transfer”, S. Pireaux, P. Defraigne, N. Bergeot, Q. Baire, C. Bruyninx, CD-rom, Session 10: Time and Frequency transfer, PTTI 2008 (Precise Time and Time Interval Systems and Applications Meeting), 1st-4th December 2008, Reston, Virginia, USA.
- “Detection of abnormal ionospheric activity from the EPN and impact on Kinematic GPS Positioning”, N. Bergeot, C. Bruyninx, E. Pottiaux, S. Pireaux, P. Defraigne, J. Legrand, Session 3: Systematic errors in GNSS, EUREF 2008 (Reference Frame sub-Commission for Europe), 17th-20th June 2008, Bruxelles, BELGIQUE, to be published by BKG. Contributions.
- “Proper time versus TCB used for time delay interferometry in the LISA mission”, S. Pireaux; “Relativistic orbit determination with the RMI (Relativistic Motion Integrator) software for the LISA mission”, S. Pireaux; Workshop: Gravitation and References for Applications in Astronomy and Physics (GRAAPH), Les Journées SF2A, 30th June-4th July 2008, Paris, FRANCE, <http://www.sf2a.asso.fr/>, proceedings GRAAPH 141 and 143.
- “Time Delay Interferometry and Time Scales in the LISA mission”, S. Pireaux, “E5b Session: Time scale, EFTF 2008 (22nd European Frequency and Time Forum)”, 23rd-25th April 2008, Toulouse, FRANCE, ?.
- “Solar quadrupole moment from planetary ephemerides: present state of the art”, S. Pireaux, E.M. Standish, E. Pitjeva and J-P. Rozelot, “JD16 Session: Nomenclature, Precession and New models in Fundamental Astronomy, IAU XXVIth General Assembly”, 14-25th August 2006, Prague, CZECH REPUBLIC, Highlights of Astronomy, Vol.14, p?.
- “Relativistic approach of the LISA mission”, S. Pireaux, B. Chauvineau, T. Regimbau and J-Y. Vinet, “LISA 6th Symposium”, 19-23th June 2006, Greenbelt (Maryland), USA, AIP Conference Proceedings, S.M. Merkowitz and J.V. Livas editors, p 364-368.
- “LISACode: simulating LISA”, A. Petiteau, G. Auger, H. Halloin, O. Jeannin, S. Pireaux, E. Plagnol, T. Regimbau, and J-Y. Vinet, “LISA 6th Symposium”, 19-23th June 2006, Goddard Space Flight Center, USA, AIP Conference Proceedings, S.M. Merkowitz and J.V. Livas editors, p 633-639.
- “The role of the Sun on the Earth’s environment: some main open questions”, J-P. Rozelot, S. Lefebvre, Z. Fazel and S. Pireaux, “11th International Conference on Solar-Terrestrial Influences”, 24-25th November 2005, Sofia, BULGARIA, Book of Abstracts p ?.
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- “Solar Outer Shape distortions and Luminosity variations”, Z. Fazel, J-P. Rozelot, S. Pireaux, S. Lefebvre and A. Ajabshirizadeh, “European Solar Physics Meeting, SPM11. The Dynamic Sun: Challenges for Theory and Observations”, 11-16th September 2005, Leuven, BELGIUM, ESA SP CD-ROM p?.
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- “Solar gravitational moments and solar core dynamics”, S. Pireaux, S. Lefebvre and J-P. Rozelot, “Les Journées SF2A: Section Programme National Terre Soleil”, 27th June-1st July 2005, Strasbourg, FRANCE, F. Casoli, T. Contini, J-M. Hameury and L. Pagany Eds, p 121, EdP-Sciences Conference Series 2005.
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- “*Relativistic modeling of the orbit of geodetic satellites equipped with accelerometers*”, S. Pireaux, JP. Barriot, P. Rosenblatt, “Les Journées Systèmes de Référence Spatio-Temporels”, 20-25th September 2004, Paris, FRANCE, N. Capitaine Eds, Paris 2005, ISBN 2-901057-51-9, p 238-239.
- “*Integrating the motion of geodetic satellites in a coherent relativistic framework*”, S. Pireaux, JP. Barriot, P. Rosenblatt, “IAG International Symposium. Gravity, Geoid and Space Missions (GGSM)”, 30th August- 3rd September 2004, Porto, PORTUGAL, IAG CD of proceedings.
- “*Solar rotation and gravitational moments: some astrophysical outcomes*”, J-P. Rozelot, S. Pireaux, S. Lefebvre, A. Ajabshirizadeh, “SOHO 14, GONG workshop - Helio and Asteroseismology. Towards a Golden Future”, 12-16th July 2004, New Haven CT, USA, ESA-SP-559, p606-610 proceedings 2004, D. Danesy Eds.
- “*A semi-classical relativistic motion integrator (SCRMI), to model the orbits of space probes around the Earth and other planets*”, S. Pireaux, J-P. Barriot and P. Rosenblatt, “35th COSPAR Scientific Assembly”, 18-25th July 2004, Paris, FRANCE, Book of Abstracts p 2246.
- “*What can we know from the solar gravitational moments? Determination, astrophysical consequences.*”, J-P. Rozelot, S. Lefebvre and S. Pireaux, “1st International Conference of Physics”, 6-9th January 2004, Teheran, IRAN, Book of Abstracts p 647.
- “*Basis for a native relativistic software integrating the motion of satellites*”, S. Pireaux, J-P. Barriot and G. Balmino, “Les Journées Systèmes de Référence Spatio-Temporels. Astrometry, Geodynamics and Solar System Dynamics: from milliarcseconds to microarcseconds.”, 22-25th September 2003, St Petersburg, RUSSIA, Book of Abstracts p 335-336, A. Finkelstein and N. Capitaine Eds.
- “*Cosmological evolutionary model for a scalar tensor theory: a confrontation between its predictions regarding light deflection and the present/future technological developments allowing to test this effect*”, Sophie Pireaux, General Relativity and gravitation, Proceedings of the “16th International Conference of the International Society on General Relativity and Gravitation (GR16)”, 15-21 juillet 2001, Durban, AFRIQUE DU SUD, N.T. Bishop and S.D. Maharaj Eds., ISBN 981-238-171-6, September 2002, p?.
- **Other publications**
 - Section “5.3 Relativité en Géodésie Spatiale” by S. Pireaux in “*GRGS - Rapport d’Activité 2003 - 2006*”, Z. Altamimi et al. April 2007.
 - “*The Sun Asphericities : astrophysical relevance*”, J-P. Rozelot, S. Pireaux and S. Lefebvre, astro-ph/0403382, 2004.
 - “*The Observable Light Deflection Angle*”, J-M. Gérard, S. Pireaux, (UCL), gr-qc/9907034, 1999.
 - “*Spectroscopy Analysis of Intensity, Thermal and Radial Velocities of the OIV in Z-Pinch Plasma*” E. de Loos, S. Pireaux, I. Tsukerman; The Weizmann Institute of Sciences (Rehovot, Israel), Scientific works submitted by the participants of the Dr. Bessie F. Lawrence 24th Summer Science Institute 1992, p100-105.

- **Accreditation** for University Teaching in France (Maître de conférence) in sections 29 “Elementary particles” and 34 “Astronomy and Astrophysics”, 2004-2008-2012.
- **Membership**
 - the GRGS (Groupe de Recherche en Géodesie Spatiale) French research group. Writing Section “5.3 Relativité en Géodesie Spatiale” of the 2003-2006 GRGS report, available on www.oca.eu/heberges/grgs/publications/index.html.
 - the GREX (Gravitation and Experiment) French research group, <http://www.spectro.jussieu.fr/GREX/>. Attending and giving seminars.
 - the “International Society on General Relativity and Gravitation”, <http://grg.maths.qmul.ac.uk/grgsoc/>. Hartle Award, October 2001-2003: “free student membership for three years for those giving the best student presentation at the Society’s conference”.
 - the French AGRET-G2 (Geodesy and Geophysics) research group. Writing the webpage “Géodésie et disciplines scientifiques associées: Relativité Générale” for AGRET-G2 : http://www.oca.eu/heberges/pnaf/Portail/Disciplines/rel_gen.html
 - the French LISA-FRANCE group (<http://www.apc.univ-paris7.fr/LISA-France/>) developing LISACode (http://www.apc.univ-paris7.fr/APC_CS/Animation/Reseaux/LISA-France/analyse.phtml).
 - the CCT (Centre de Compétences Techniques) of the CNES (French Centre National d’Etudes Spatiales), <http://cct.cnes.fr/cctinfo/accueil.htm>. Attending and giving seminars for the ORB (orbital mechanics) section.
- **Scholarships:**
 - from the “FRS” (“Fond pour la Recherche Scientifique”) and from the “LOC” (“*Local Organizing committee*” for participating to Symposium IAU 261, 27 avril-1er mai 2009).
 - from the “FRS” (“Fond pour la Recherche Scientifique”) and from the “*Fondation Agathon de Potter, Académie Royale de Belgique*” for participating to EFTF08, 23rd - 25th April 2008.
 - from the “FNRS” (“Fond National pour la Recherche Scientifique”) and from the “*Arnold Rosenblum Foundation*” for participating to GR16, 15th - 21st July 2001.
 - from the “FNRS” for participating to the “International School of Astrophysics: D. Chalonge, 5th-16th December 1999”.
 - from the “*Communauté Française de Belgique*” for participating to the “IPM School on Cosmology, 23rd January-4th February 1999”
 - *Rotary Exchange Student* 1993, USA, ND, August 1992 - July 1993
 - “*Weizmann Institute of Sciences, International Summer Sciences Institute 1992*”, Rehovot Israel, 8th July -7th August 1992
- **Others:**
 - Writing and shaping several webpages (“Cycle solaire”, “Forme solaire”, “Hélio-mécanique”) for the AMS team, OCA, France: <http://www.oca.eu/gemini/equipements/ams.html>.
 - Providing material (such as a stabilized version of the ATOMIUM software, GNSS-ionosphere related bibliographies or links...) to be added to ROB (Belgium) Section 1 intranet website for the ionosphere-GPS team in the framework of the STCE (Solar and Terrestrial Center of Excellence).
 - Supervision of student jobs at ROB, Belgium, August 2008.
 - Supervision (promotor) of a PhD Thesis subject proposed at UCL-ROB, Belgium, jointly with V. Dehant (ROB), starting academic year 2008-2009.

Workshop organized by the “Centre de Compétence Technique: Mécanique Orbitale” (4th May 2007), CNES, FRANCE, “General Relativity: from basic notions to applications in orbitography” (2 hours):

- Relativistic Motion Integrator: a modern general relativistic approach to orbitography. Illustration with the space mission LISA.
- A general relativistic methodology for laser links (computing photon time transfer in the setting of General Relativity). Illustration with the space mission LISA.

Groupe de Recherche en Géodésie Spatiale (GRGS) summer school (30th August - 3rd September 2004), Forcalquier, France “Space Geodesy, physics measurements and fundamental physics” (4 hours):

- I. Key tools for relativistic gravitational effects: Parametrized Post-Newtonian (PPN) formalism, constancy of the Newtonian gravitational constant (G), IAU resolutions on reference systems.
- II. Introduction to celestial mechanics: Two body system in weak field approximation, main relativistic effects in celestial mechanics (perihelion advance, geodetic precession, gravito-magnetic effects on orbits) and tests of relativistic theories of gravitation (Earth-Moon system, Nordtvedt effect, constraints on β parameter and on the variation of G)
- III. Geodesy and tests of alternative relativistic theories of gravitation: Geodetic satellite equations of motion, main relativistic effects in geodesy, satellite tests of relativistic theories of gravitation (gravito-magnetic effects on the orbit of the satellite LAGEOS, Gravity probe B...)

Workshop organized by the “Centre de Compétence Technique: Mécanique Orbitale” (14th January 2004), CNES, FRANCE, “Time and Space Reference Systems: New IAU recommendations” (4 hours):

- “Relativity and time transformations: an operational point of view”.

Teaching at UCL, Belgium (about 590 hours):

- PHYS 2143, UCL - General Relativity - J-M.Gérard [22,5-15-0]- 1st s., 1 class (15h) + tutorial: 2001-2002, 1999-2000, 1998-1999.
- FSA 1403, UCL - Physics III: waves - P. Sobievski, R. Prieels - 1st s., 2 classes (2X12h): 2000-2001; 3 classes: 1997-1998.
- AGRO 1200, UCL - General Physics II - R. Prieels [60-60-0]- 2nd s., 2 classes (2X24h): 2000-2001, 1999-2000, 1998-1999; 1 class: 1997-1998.
- TUTORIAL AGRO 1200, UCL - General Physics II - R. Prieels - 2nd s., 2 classes (2X24h): 2000-2001, 1999-2000; 1 class: 1998-1999.
- PHYS 1100, UCL - General Physics I - G. Schayes, F. Brouillard, P. Defrance, J-D. Lega, B. Piraux [75-90-0], 1st s., 2 classes SC11b (2X24h), 1998-1997.
- PHYS 1190, UCL - General Physics (1st part) - B. Piraux, T. Delbar, G. Schayes - 1st s., 1 class AGRO (18h): 1997-1998.
- MATH 1175, UCL - Analytical Mechanics (1st part) - J. Bricmont, P. Habets, K. Peiffer - 2nd s., 2 classes (60h) + tutorial, 1997-1998.

Key:

The acronyms PHYS, MATH, FSA, AGRO represent students in physics, mathematics, engineering and agronomics respectively.

The first number represents the university level: junior undergraduate (1) or senior undergraduate (2); the second number represents the year, first (1) or second year (2) of junior/senior undergraduate studies; the third number is the course identifier. The total hours of lectures, exercises and laboratory exercises are given between brackets. The different courses are given either during the first (1st s.) or second semester (2nd s.). Names of the chairmen are also provided.