

Yvain QUÉAU

Post-doctoral Researcher
in Computer Vision

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yqueau

28 years old



Research Interests

Inverse Problems	Reconstruction, inpainting, super-resolution
Mathematical Imaging	Variational methods, Bayesian inference, PDEs
3D-Reconstruction	Shape-from-shading, photometric stereo, multi-view stereo, RGB-D sensing
Numerical Optimization	Convex or non-convex, continuous or discrete

Current Situation

Since Sep. 2016 **Technical University of Munich** (Germany)
Post-doc
Research and lectures on variational methods for computer vision
Hosted by Prof. Daniel CREMERS, chair of computer vision

Past Academic Experiences

- Mar. 2016 - Aug. 2016 **INP-ENSEEIH, IRIT** (Toulouse, France)
Research and teaching assistant (ATER)
Teaching in the department of Computer Science and Applied Mathematics
Research on mathematical imaging, in the group of Prof. Vincent CHARVILLAT
- Dec. 2015 - Feb. 2016 **Université Paul Sabatier, IRIT** (Toulouse, France)
Researcher
Research on mathematical imaging, in the group of Prof. Vincent CHARVILLAT
Funded by a grant from LabEx CIMI
- Dec. 2012 - Nov. 2015 **INP-ENSEEIH, IRIT** (Toulouse, France)
Research and teaching assistant (Moniteur)
Teaching in the department of Computer Science and Applied Mathematics
Ph.D thesis on 3D-reconstruction by photometric stereo
Funded by a grant from the French ministry of research
Supervisor: Assoc. Prof. Jean-Denis DUROU
- Apr. 2012 - Sep. 2012 **IRIT** (Toulouse, France), **DIKU** (Copenhagen, Denmark)
Research intern
Master thesis on variational methods for 3D-reconstruction
Supervisors: Assoc. Profs. Jean-Denis DUROU and François LAUZE
- June 2011 - Sep. 2011 **IRIT** (Toulouse, France)
Research intern
Machine learning for 3D-vision
Supervisors: Prof. Vincent CHARVILLAT and Assoc. Prof. Jean-Denis DUROU

Education

- Feb. 2016 **“Maître de conférences” qualification in:**
- applied mathematics (CNU section 26, number 16226292024)
- computer science (CNU section 27, number 16227292024)
- signal processing (CNU section 61, number 16261292024)

- Dec. 2012 - Nov. 2015 **Ph.D in Image, Information and Hypermedia**
Title of the thesis: Reconstruction tridimensionnelle par stéréophotométrie
Defended on: November 26, 2015 in Toulouse (France)
Delivered by: Institut National Polytechnique de Toulouse (INPT)
Laboratory: Institut de Recherche en Informatique de Toulouse (IRIT)
Jury:

Adrien BARTOLI	<i>Referee</i>	Prof., ISIT, Clermont-Ferrand (France)
Daniel CREMERS	<i>Referee</i>	Prof., TUM, Munich (Germany)
Maurizio FALCONE	<i>Referee</i>	Prof., La Sapienza, Roma (Italy)
Vincent CHARVILLAT	<i>President</i>	Prof., INP, Toulouse (France)
Jean-Denis DUROU	<i>Supervisor</i>	Assoc. Prof., UPS, Toulouse (France)
Olivier AUBRETON	<i>Member</i>	Assoc. Prof., LE2i, Le Creusot (France)
Jean-François AUJOL	<i>Member</i>	Prof., IMB, Bordeaux (France)
Pierre GURDJOS	<i>Member</i>	IR, CNRS (France)
Xavier DESCOMBES	<i>Guest</i>	DR, INRIA, Sophia-Antipolis (France)
François LAUZE	<i>Guest</i>	Assoc. Prof., DIKU, Copenhagen (Denmark)

- Sep. 2009 - Sep. 2012 **Master of Sciences + Engineering Degree in Computer Science and Applied Mathematics** (INP-ENSEEIH, Toulouse, France)

Awards and Grants

- June 2017 Best reviewer award at SSVM 2017
May 2017 INP’INNOV (technological transfer) award
May 2017 Leopold Escande (Ph.D dissertation) award
Jan. 2017 Editor’s choice award from Image and Vision Computing (Elsevier)
July 2015 Grant from LabEx CIMI for a short-term research contract
Jan. 2014 Best presentation award at CORESA 2014
June 2012 Grant from the French ministry of research for a three-years Ph.D (“moniteur”)

Teaching Duties in TU Munich

Lectures

- Winter Semester **Computer Vision I: Variational Methods** (*Master, 8ECTS*)
2017-2018 20 lectures in English
Introduction to computer vision
Classic inverse problems: denoising, optical flow, segmentation, etc.
Mathematical formalization and solving using variational methods

Current Ph.D Students

- Bjorn HAEFNER *Variational methods for depth super-resolution*, TU Munich (Germany), started Jan. 2017 - “mentor” (main supervisor Daniel CREMERS)
Jean MÉLOU *Creation of 3D-models for the VFX industry*, INP Toulouse (France) and Mikros Image (Levallois-Perret, France), started July 2016 - 50% supervision (co-supervisor Jean-Denis DUROU)

Current Master Students in TU Munich

- Basile TOUSSIDE *Shading-aware multi-view reconstruction using RGBD sensors*, Started Jan. 2017, 100% supervision
Qassim AKHTAR *A portable high resolution 3D-reconstruction system*, started Jan. 2017, 100% supervision

- Natalia SAIPOVA *High-performance non-convex variational methods for 3D-reconstruction on the GPU*, started Jan. 2017, 100% supervision
- Oleksandra GANUS *An RGBD system for acquiring full 3D-shape and reflectance of the human body*, started Dec. 2016, 100% supervision
- Hesam RABETI *Real-time mobile exposure correction*, started Nov. 2016, 100% supervision
- Former Master Students in TU Munich**
- Songyou PENG *Real-time variational depth refinement with color photometric stereo*, Feb.-May 2017, 100% supervision
- Christian BUTTNER *Portable SVBRDF capture for quasi-planar surfaces*, Nov. 2016-Sep. 2017, 100% supervision
- Andreas SEIBOLD *Single-view 3D-reconstruction using ballooning, shading and proximal methods for non-convex optimization*, Nov. 2016-Aug. 2017, 50% supervision (co-supervisor Thomas MÖLLENHOFF)
- Participation to a Defense Jury**
- Andrej PANGERCIC *Development of the Low Cost UAV Platform for 3D Reconstruction of the Environment*, Master thesis of the university of Ljubljana (Slovenia) defended in TU Munich on March 29, 2017 (president of the jury)

Past Teaching Duties in INP Toulouse

Lectures, Tutorials and Practicals (in French)

- 2012-2016 **Signal and Image Processing (Master)**
Lectures and practicals
Total: 80 h
- 2012-2016 **Computer Vision (Master)**
Lectures and practicals
Total: 20 h
- 2012-2016 **Probabilities and Statistics (Bachelor)**
Lectures, tutorials and practicals
Total: 150 h
- 2013-2014 **Operational Research (Bachelor)**
Lectures, tutorials and practicals
Total: 20 h
- 2012-2013 **Programming Android Applications (Bachelor)**
Practicals
Total: 20 h
- 2012-2013 **Distributed Systems and Applications (Bachelor)**
Practicals
Total: 20 h

Supervision of Research Interns

- Louis FAUVARQUE *Reading 3D-sonograms on a smartphone*, June-Sep. 2016, 60% supervision (co-supervisors Jean-Denis DUROU and Gilles AZZARO)
- Jade BOUMAZA *Single-view high precision 3D-reconstruction*, June-Sep. 2015, 60% supervision (co-supervisors Jean-Denis DUROU and François LAUZE)
- Tom LUCAS *Variational fusion of RGB-D data*, June-Sep. 2015, 60% supervision (co-supervisors Jean-Denis DUROU and François LAUZE)
- Mathieu PIZENBERG *Geometric and photometric calibration of a dermoscope*, June-Sep. 2014, 60% supervision (co-supervisor Jean-Denis DUROU)
- Richard MODRZEJEWSKI *Turning a mobile device into a 3D-scanner*, June-Sep. 2014, 60% supervision (co-supervisors Jean-Denis DUROU and Pierre GURDJOS)

Academic Service

- Program Committee QCAV 2017 (Tokyo, Japan, May 14-16, 2017),
SSVM 2017 (Kolding, Denmark, June 4-8, 2017)
- Chairman QCAV 2017 (Tokyo, Japan, May 14-16, 2017),
SSVM 2017 (Kolding, Denmark, June 4-8, 2017)
- Workshop Organizer “Photometric stereo: from theory to industrial applications”, associated with QCAV
2015 (Le Creusot, France, June 3-5, 2015)
- Reviewer for Journals SIAM: Journal of Imaging Science
Springer: Int. J. Comput. Vis., Journal of Mathematical Imaging and Vision
IEEE: Transactions on Image Processing
Elsevier: Computers and Graphics, Signal Processing: Image Communications
IET: Computer Vision
Kuwait University: Journal of Engineering Research
- Reviewer for Conferences WACV 2017 and 2018
ICCV 2017
SSVM 2015 and 2017
QCAV 2015 and 2017
RFIA 2016

Academic Collaborations

- TU Munich, Prof. Daniel CREMERS’s group
Germany
- TU Brandenburg, Prof. Michael BREUSS’s group
Germany
- Univ. of Copenhagen, Assoc. Prof. François LAUZE
Denmark
- La Sapienza, Roma, Prof. Maurizio FALCONE
Italy
- Univ. of Bologna, Dr. Roberto MECCA
Italy
- Univ. of Cambridge, Prof. Roberto CIPOLLA’s group
UK
- Univ. of Bordeaux, Prof. Jean-François AUJOL
France
- INRIA Nice, DR2 Xavier DESCOMBES
France
- Univ. of Toulouse, Prof. Vincent CHARVILLAT’s group
France

Industrial Collaborations

- Photosculptura Prototyping a human face 3D-scanner based on photometric stereo. Project started
(Netherlands) Dec. 2016
- Google Automatic exposure correction for mobile devices (Hesam RABETI’s Master thesis).
(Munich, Germany) Tool now integrated to Google Tango. Project started Nov. 2016
- Pixience Development of a 3D module for the dermoscope. Module now commercialised by
(Toulouse, France) the society, see <http://www.pixience.com/produits-2/module-3d/>. Industrial transfer led by Toulouse Tech Transfer, June 2014 - June 2015
- Fitting Box Prototyping a realistic relighting solution for augmented reality, and a 3D-
(Toulouse, France) reconstruction room prototype. Industrial transfer led by Toulouse Tech Transfer, Jan. 2013 - June 2014

Mobility

Invited Research Stays

- Jan. 2017 La Sapienza, Roma, Italy. Invited by Prof. Maurizio FALCONE
- Feb. 2016 Univ. of Copenhagen, Denmark. Invited by Assoc. Prof. François LAUZE
- Jan. 2016 TU Brandenburg, Cottbus, Germany. Invited by Prof. Michael BREUSS
- Apr. 2015 Univ. of Bologna, Italy. Invited by Dr. Roberto MECCA
- Jan. 2015 TU Brandenburg, Cottbus, Germany. Invited by Prof. Michael BREUSS
- Dec. 2013 Univ. of Copenhagen, Denmark. Invited by Assoc. Prof. François LAUZE
- Jun.-Aug. 2012 Univ. of Copenhagen, Denmark. Invited by Assoc. Prof. François LAUZE

Conferences Attended

- CVPR 2017 Poster, Honolulu, USA, June 2017
- SSVM 2017 Two orals and one poster, Kolding, Denmark, June 2017
- QCAV 2017 Oral, Tokyo, Japan, May 2017
- CVPR 2016 Poster, Las Vegas, USA, June 2016
- ALGORITMY 2016 Poster, Podbanske, Slovakia, Mar. 2016
- ORASIS 2015 Oral, Amiens, France, June 2015
- SSVM 2015 Two posters, Lège Cap-Ferret, France, June 2015
- QCAV 2015 Oral, Le Creusot, France, June 2015
- CORESA 2014 Oral, Reims, France, Nov. 2014
- RFIA 2014 Poster, Rouen, France, July Nov. 2014
- ORASIS 2013 Oral, Cluny, France, June 2013
- SSVM 2013 Oral, Graz, Austria, June 2013

Workshops Attended

- June 2017 CNRS summer school “Méthodes numériques et algorithmes pour la vision par ordinateur: dernières tendances”: poster, Albas, France
- Mar. 2015 Colloquium “Espace, Perspective et Fragmentation”: oral, École supérieure d’audiovisuel (ESAV), Toulouse, France
- Dec. 2014 Conference “Numerical methods for PDEs: optimal control, games and image processing: a conference on the occasion of the 60th birthday of Maurizio Falcone”: oral (with Jean-Denis DUROU), University La Sapienza, Roma, Italy
- Oct. 2014 Workshop “Variational methods in imaging”: poster, RICAM, Linz, Austria
- Apr. 2014 CNRS seminar “Mesure dimensionnelle par vision”: oral, Telecom ParisTech, France
- May 2013 CNRS summer school “Nouvelles tendances en vision par ordinateur, approches variationnelles et probabilistes”: poster, Cabrerets, France
- Aug. 2012 Summer school “Domain adaptation in Image Analysis”, Copenhagen, Denmark
- Nov. 2011 Workshop IRIT/Kyushu on Image and Multimedia: poster, Toulouse

General Skills

Computer Science

- Languages Matlab, C, C++, Python
- OS Windows, GNU/Linux
- Tools GitHub, L^AT_EX, Microsoft Office, LibreOffice, Inkscape, Photoshop

Languages

- French Native speaker
- English Fluent (C2, 905 TOEIC)
- Spanish Basic knowledge (B1)

Full List of Peer-Reviewed Publications

Ph.D Thesis

- [T1] Y. Quéau. “Reconstruction tridimensionnelle par stéréophotométrie”. Thèse de doctorat. Université de Toulouse, 2015. 308 pp. URL: <https://hal.archives-ouvertes.fr/tel-01261526>. (**Léopold Escande 2016 award**).

International Journal Articles

- [J6] Y. Quéau, B. Durix, T. Wu, D. Cremers, F. Lauze, and J.-D. Durou. “LED-based Photometric Stereo: Modeling, Calibration and Numerical Solution”. *Journal of Mathematical Imaging and Vision* (2017). Springer, 28 p. (to appear).
- [J5] Y. Quéau, R. Mecca, J.-D. Durou, and X. Descombes. “Photometric Stereo with Only Two Images: A Theoretical Study and Numerical Resolution”. *Image and Vision Computing* 57 (2017). Elsevier, pp. 175–191. (**Editor’s choice**).
- [J4] M. Bähr, M. Breuss, Y. Quéau, A. S. Boroujerdi, and J.-D. Durou. “Fast and Accurate Surface Normal Integration on Non-Rectangular Domains”. *Computational Visual Media* 3.2 (2017). Springer, pp. 107–129.
- [J3] R. Mecca, Y. Quéau, F. Logothetis, and R. Cipolla. “A Single Lobe Photometric Stereo Approach for Heterogenous Material”. *SIAM Journal on Imaging Sciences* 9.4 (2016). SIAM, pp. 1858–1888.
- [J2] Y. Quéau, R. Modrzejewski, P. Gurdjos, and J.-D. Durou. “A full photometric and geometric model for attached webcam/matte screen devices”. *Signal Processing: Image Communication* 40 (2016). Elsevier, pp. 65–81.
- [J1] Y. Quéau, F. Lauze, and J.-D. Durou. “Solving Uncalibrated Photometric Stereo using Total Variation”. *Journal of Mathematical Imaging and Vision* 52.1 (2015). Springer, pp. 87–107.

International Journal Articles Under Review

- [P2] Y. Quéau, J.-D. Durou, and J.-F. Aujol. “Variational Methods for Normal Integration”. 24 p. URL: <https://arxiv.org/abs/1709.05965>.
- [P1] Y. Quéau, J.-D. Durou, and J.-F. Aujol. “Normal Integration: A Survey”. 18 p. URL: <https://arxiv.org/abs/1709.05940>.

International Conference Proceedings

- [C15] S. Peng, B. Häfner, Y. Quéau, and D. Cremers. “Depth Super-Resolution Meets Uncalibrated Photometric Stereo”. *International Conference on Computer Vision Workshops (ICCVW)*. IEEE. Venice, Italy, 2017. 8 p.
- [C14] Y. Quéau, T. Wu, F. Lauze, J.-D. Durou, and D. Cremers. “A Non-Convex Variational Approach to Photometric Stereo under Inaccurate Lighting”. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. IEEE. Honolulu, USA, 2017. 10 p.
- [C13] Y. Quéau, T. Wu, and D. Cremers. “Semi-Calibrated Near-Light Photometric Stereo”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 10302. Lecture Notes in Computer Science. Springer. Kolding, Denmark, 2017, pp. 656–668.
- [C12] F. Lauze, Y. Quéau, and H.-O. Sorensen. “Simultaneous Reconstruction and Segmentation of CT Scans with Shadowed Data”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 10302. Lecture Notes in Computer Science. Springer. Kolding, Denmark, 2017, pp. 308–319.
- [C11] J. Mélou, Y. Quéau, J.-D. Durou, F. Castan, and D. Cremers. “Beyond Multi-view Stereo: Shading-Reflectance Decomposition”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 10302. Lecture Notes in Computer Science. Springer. Kolding, Denmark, 2017, pp. 694–705. (**Article selected for publication of an extended version in Journal of Mathematical Imaging and Vision**).
- [C10] Y. Quéau, M. Pizenberg, J.-D. Durou, and D. Cremers. “Microgeometry capture and RGB albedo estimation by photometric stereo without demosaicing”. *International Conference on Quality Control by Artificial Vision (QCAV)*. Vol. 1338. Proceedings of SPIE. SPIE Digital Library. Tokyo, Japan, 2017. 7 p.

- [C9] Y. Quéau, R. Mecca, and J.-D. Durou. “Unbiased Photometric Stereo for Colored Surfaces: A Variational Approach”. *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*. IEEE. Las Vegas, USA, 2016, pp. 3707–3716.
- [C8] L. Hoeltgen, Y. Quéau, M. Breuß, and G. Radow. “Optimised photometric stereo via non-convex variational minimisation”. *British Machine Vision Conference (BMVC)*. BMVA Press. York, UK, 2016. 12 p.
- [C7] F. Logothetis, R. Mecca, Y. Quéau, and R. Cipolla. “Near-Field Photometric Stereo in Ambient Light”. *British Machine Vision Conference (BMVC)*. BMVA Press. York, UK, 2016. 12 p.
- [C6] R. Mecca and Y. Quéau. “Unifying diffuse and specular reflections for the photometric stereo problem”. *IEEE Winter Conference on Applications of Computer Vision (WACV)*. IEEE. Lake Placid, USA, 2016. 9 p.
- [C5] M. Breuß, Y. Quéau, M. Bähr, and J.-D. Durou. “Highly Efficient Surface Normal Integration”. *Algorithmy Conference on Scientific Computing (ALGORITMY)*. Slovak University of Technology. Podbanske, Slovakia, 2016, pp. 204–213.
- [C4] Y. Quéau, F. Lauze, and J.-D. Durou. “A L1-TV Algorithm for Robust Perspective Photometric Stereo with Spatially-Varying Lightings”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 9087. Lecture Notes in Computer Science. Springer. Lège Cap-Ferret, France, 2015, pp. 498–510.
- [C3] Y. Quéau and J.-D. Durou. “Edge-Preserving Integration of a Normal Field: Weighted Least Squares, TV and L1 Approaches”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 9087. Lecture Notes in Computer Science. Springer. Lège Cap-Ferret, France, 2015, pp. 576–588.
- [C2] Y. Quéau and J.-D. Durou. “Some Illumination Models for Industrial Applications of Photometric Stereo”. *International Conference on Quality Control by Artificial Vision (QCAV)*. Vol. 9534. Proceedings of SPIE. SPIE Digital Library. Le Creusot, France, 2015. 7 p.
- [C1] Y. Quéau, F. Lauze, and J.-D. Durou. “Solving the Uncalibrated Photometric Stereo Problem using Total Variation”. *International Conference on Scale Space and Variational Methods in Computer Vision (SSVM)*. Vol. 7893. Lecture Notes in Computer Science. Springer. Schloss Seggau, Austria, 2013, pp. 270–281. **(Article selected for publication of an extended version in Journal of Mathematical Imaging and Vision)**.

French Journal Articles

- [FJ2] Y. Quéau, B. Durix, T. Lucas, J. Boumaza, J.-D. Durou, and F. Lauze. “Fusion de données RVB-D par stéréophotométrie colorée”. *Traitement du Signal* (2017). Lavoisier. (to appear).
- [FJ1] Y. Quéau, J.-D. Durou, B. Durix, and V. Charvillat. “Stéréophotométrie non calibrée en présence d’écarts au modèle lambertien”. *Traitement du Signal* 31.1-2 (2014). Lavoisier, pp. 107–141.

French Conference Proceedings

- [FC10] Y. Quéau, M. Pizenberg, D. Cremers, and J.-D. Durou. “Stéréophotométrie microscopique sans démosaïquage”. *Colloque GRETSI*. Juan-les-Pins, France, 2017. 4 p.
- [FC9] J. Mélou, Y. Quéau, J.-D. Durou, F. Castan, and D. Cremers. “Estimation de la réflectance à partir de données multi-vues”. *Orasis, Congrès des jeunes chercheurs en vision par ordinateur*. AFRIF. Colleville-sur-Mer, France, 2017. 8 p.
- [FC8] Y. Quéau, B. Durix, T. Lucas, J. Boumaza, J.-D. Durou, and F. Lauze. “Fusion de données RVB-D par stéréophotométrie colorée”. *Congrès Francophone de Reconnaissance des Formes et Intelligence Artificielle (RFIA)*. AFRIF-AFIA. Clermont-Ferrand, France, 2016. 8 p. **(Article selected for publication of an extended version in Traitement du Signal)**.
- [FC7] B. Durix, Y. Quéau, T. Lucas, J. Boumaza, J.-D. Durou, and F. Lauze. “Étalonnage de sources lumineuses de type LED”. *Congrès Francophone de Reconnaissance des Formes et Intelligence Artificielle (RFIA)*. AFRIF-AFIA. Clermont-Ferrand, France, 2016. 8 p.
- [FC6] Y. Quéau, J.-D. Durou, and X. Descombes. “Que peut-on apprendre d’une scène vue par une webcam à partir d’images prises au cours d’une journée ensoleillée ?” *Orasis, Congrès des jeunes chercheurs en vision par ordinateur*. AFRIF. Amiens, France, 2015. 8 p.

- [FC5] Y. Quéau and J.-D. Durou. “Intégration d’un champ de gradient rapide et robuste aux discontinuités - Application à la stéréophotométrie”. *Congrès Francophone de Reconnaissance des Formes et Intelligence Artificielle (RFIA)*. AFRIF-AFIA. Rouen, France, 2014. 8 p.
- [FC4] Y. Quéau, R. Modrzejewski, P. Gurdjos, and J.-D. Durou. “Transformation d’un dispositif multimédia webcam-écran en un scanner 3D”. *COmpression et REprésentation des Signaux Audiovisuels (CORESA)*. IUT de Reims. Reims, France, 2014. 6 p. **(Best presentation award - Article selected for publication of an extended version in Signal Processing: Image Communications)**.
- [FC3] Y. Quéau and J.-D. Durou. “Résolution du problème de la stéréophotométrie non calibrée par estimation de l’intensité des éclairages”. *Orasis, Congrès des jeunes chercheurs en vision par ordinateur*. AFRIF. Cluny, France, 2013. 8 p. **(Article selected for publication of an extended version in Traitement du Signal)**.
- [FC2] B. Durix, Y. Quéau, V. Charvillat, and J.-D. Durou. “Quels prétraitements pour la stéréophotométrie non calibrée ?” *Orasis, Congrès des jeunes chercheurs en vision par ordinateur*. AFRIF. Cluny, France, 2013. 8 p.
- [FC1] J.-D. Durou, Y. Quéau, and V. Charvillat. “Résolution de la stéréophotométrie par apprentissage”. *Congrès Francophone de Reconnaissance des Formes et Intelligence Artificielle (RFIA)*. AFRIF-AFIA. Lyon, France, 2012. 8 p.