

CURRICULUM VITAE

Name: Kristina IRSCH, Ph.D.

DEMOGRAPHIC AND PERSONAL INFORMATION

Current position

Research Scientist – CRCN, CNRS
Vision Institute
CNRS UMR 7210
Paris, France

Personal data

Business address: Institut de la Vision
17, rue Moreau
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France
Phone: +33 (0)7 82 31 58 60
E-mail: kristina.irsch@inserm.fr
Date of Birth: April 24, 1982
Place of Birth: Merzig (Saar), Germany

EDUCATION

04/2003 Pre-diploma ("Vordiplom") in Physics, University of Heidelberg, Heidelberg, Germany.
04/2006 Master of Science (M.Sc.) in Medical Physics with Distinction in Radiotherapy and Biomedical Optics, University of Heidelberg and University Hospital in Mannheim, Germany.
04/2007 Diploma ("Diplom," equivalent of Master's degree) in Physics, University of Heidelberg, Heidelberg, Germany.
12/2008 Ph.D. ("Dr. rer. nat.") in Physics (Thesis advisor: Josef Bille, Ph.D.), University of Heidelberg, Heidelberg, Germany.

PROFESSIONAL EXPERIENCE

04/04 - 09/05 Assistant for Accelerator Operation ("Hilfsoperateur"), Max Planck Institute for Nuclear Physics, Heidelberg, Germany.
06/05 - 12/08 Member, Biomedical Optics group (Josef F. Bille, Ph.D.), Kirchhoff Institute for Physics, University of Heidelberg, Heidelberg, Germany.
12/05 - 05/06, Graduate research in Ophthalmic Optics and Instrumentation, The Wilmer Eye Institute at The Johns Hopkins University School of Medicine, Baltimore, Maryland, USA.
10/06 - 09/08
10/07 - 12/07, Research Associate ("Wissenschaftlicher Mitarbeiter") in the position of a Teaching Assistant, University of Heidelberg School of Medicine, Mannheim, Germany.
10/08 - 12/08
01/09 - 05/10 Postdoctoral research fellowship in Ophthalmology (David L. Guyton, M.D.), The Wilmer Eye Institute at The Johns Hopkins University School of Medicine, Baltimore, Maryland, USA.
06/10 - 03/14 Assistant Professor of Ophthalmology, The Wilmer Eye Institute, The Johns Hopkins University School of Medicine, Baltimore, Maryland, USA (Professional Leave 03/14).
03/14 - present Researcher, Vision Institute and Quinze-Vingts National Eye Hospital, Paris, France.
03/17 - 02/19 Marie Skłodowska-Curie Reintegration Fellow (Sorbonne University)
As of 10/19 - Research Scientist ("Chargé de recherche de classe normale," CRCN) at the French National Center for Scientific Research ("Centre National de la Recherche Scientifique," CNRS)

RESEARCH ACTIVITIES

Publications in peer-reviewed journals (* Corresponding author)

1. Agopov M, Gramatikov BI, Wu YK, **Irsch K**, Guyton DL. Use of retinal nerve fiber layer birefringence as an addition to absorption in retinal scanning for biometric purposes. *Applied Optics* 2008; 47(8): 1048-1053. Also selected for publication in the *Virtual Journal for Biomedical Optics* 2008; 3(4).
2. Ramey NA, Ying HS, **Irsch K**, Müllenbroich MC, Vaswani R, Guyton DL. A novel haploscopic viewing apparatus with a three-axis eye tracker. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2008; 12(5): 498-503.
3. **Irsch K***, Ramey NA, Kurz A, Guyton DL, Ying HS. Video-based head movement compensation for novel haploscopic eye tracking apparatus. *Investigative Ophthalmology & Visual Science* 2009; 50(3): 1152-1157.
4. Babar S, Khare GD, Vaswani RS, **Irsch K**, Mattheu JS, Walsh L, Guyton DL. Eye dominance and the mechanisms of eye contact. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2010; 14(1): 52-57.
5. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. Modeling and minimizing interference from corneal birefringence in retinal birefringence scanning for foveal fixation detection. *Biomedical Optics Express* 2011; 2(7): 1955-1968.
6. **Irsch K***, Shah AA. Birefringence of the central cornea in children assessed with scanning laser polarimetry. *Journal of Biomedical Optics* 2012; 17(8): 086001.
7. Deng H, **Irsch K***, Gutmark R, Phamonvaechavan P, Foo F, Anwar DS, Guyton DL. Fusion can mask the relationships between fundus torsion, oblique muscle overaction/underaction, and A- and V-pattern strabismus. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2013; 17(2): 177-183.
8. **Irsch K***, Guyton DL, Ramey NA, Adyanthaya RS, Ying HS. Vertical vergence adaptation produces an objective vertical deviation that changes with head tilt. *Investigative Ophthalmology & Visual Science* 2013; 54(5): 3108-3114.
9. Gramatikov B, **Irsch K**, Müllenbroich M, Frindt N, Qu Y, Gutmark R, Wu K, Guyton D. A device for continuous monitoring of true central fixation based on foveal birefringence. *Annals of Biomedical Engineering* 2013; 41(9): 1968-1978.
10. Muthusamy B, Chang HP, **Irsch K**, Muthusamy K, Anwar DS, Ying HS, Guyton DL. Differentiating bilateral superior oblique palsy from sensory extorsion. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2013; 17(5): 471-476.
11. Deschler EK, **Irsch K**, Guyton KL, Guyton DL. A new, removable, sliding noose for adjustable-suture strabismus surgery. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2013; 17(5): 524-527.
12. Muthusamy B, **Irsch K**, Chang HP, Guyton DL. The sensitivity of the Bielschowsky head tilt test in diagnosing acquired bilateral superior oblique palsy. *American Journal of Ophthalmology* 2014; 157(4): 901-907.
13. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. Improved eye-fixation detection using polarization-modulated retinal birefringence scanning, immune to corneal birefringence. *Optics Express* 2014; 22(7): 7972-7988. Also selected for publication in the *Virtual Journal for Biomedical Optics* 2014; 9(6).
14. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. New pediatric vision screener employing polarization-modulated, retinal-birefringence-scanning-based strabismus detection and bull's eye focus detection with an improved target system: opto-mechanical design and operation. *Journal of Biomedical Optics* 2014; 19(6): 067004.
15. Adyanthaya RS, Broome S, Muthusamy B, **Irsch K**, Klein KS, Guyton DL. Children with Down syndrome benefit from bifocals as evidenced by increased compliance with spectacle wear. *Journal of the American Association for Pediatric Ophthalmology and Strabismus* 2014; 18: 481-484.
16. Gramatikov BI, **Irsch K**, Guyton DL. Optimal timing of retinal scanning during dark adaptation, in the presence of fixation on a target: The role of pupil size dynamics. *Journal of Biomedical Optics* 2014; 19(10): 106014.
17. **Irsch K**. Optical issues in measuring strabismus. *Middle East African Journal of Ophthalmology* 2015; 22: 265-270. (Invited review article).
18. **Irsch K***, Guyton DL, Park HS, Ying HS. Mechanisms of vertical fusional vergence in patients with "congenital superior oblique palsy" investigated with an eye-tracking haploscope. *Investigative Ophthalmology & Visual Science* 2015; 56(9): 5362-5369.

19. Gramatikov BI, **Irsch K**, Wu YK, Guyton DL. New pediatric vision screener – Part II: electronics, software, signal processing, and validation. *BioMedical Engineering OnLine* 2016; 15(1): 15.
20. Gramatikov BI, Rangarajan S, **Irsch K**, Guyton DL. Attention attraction in an ophthalmic diagnostic device using sound-modulated fixation targets. *Medical Engineering & Physics* 2016; 38: 818-821.
21. Borderie M, Grieve K, **Irsch K**, Georgeon C, Ghoubay D, Desousa C, Laroche L, Borderie V. New parameters in assessment of human donor corneal stroma. *Acta Ophthalmologica* 2017; 95(4):e297-e306.
22. Catrysse PB, **Irsch K**, Javidi B, Preza C, Testorf M, Zalevsky Z. Modern imaging: introduction to the feature issue. *Applied Optics* 2017; 56(9): MI1-MI2. (**Editorial**).
23. Meimon S, Jarosz J, Petit C, Gofas Salas E, Grieve K, Conan JM, Emica B, Paques M, **Irsch K**. Pupil motion analysis and tracking in ophthalmic systems equipped with wavefront sensing technology. *Applied Optics* 2017; 56(9): D66-D71.
24. Mazlin V, Xiao P, Dalimier E, Grieve K, **Irsch K**, Sahel J-A, Fink M, Boccara AC. In vivo high resolution human corneal imaging using full-field optical coherence tomography. *Biomedical Optics Express* 2018; 9(2): 557-568. (*Selected as "Editor's pick"*).
25. **Irsch K***, Grieve K, Borderie M, Ghoubay D, Georgeon C, Borderie V. Full-field optical coherence microscopy for histology-like analysis of stromal features in corneal grafts. *Journal of Visualized Experiments* (in press).
26. Bocheux R, Pernot P, Borderie V, Plamann K, **Irsch K***. Quantitative measures of corneal transparency, derived from objective analysis of depth-resolved corneal images, demonstrated with full-field optical coherence tomographic microscopy. *PLoS ONE* 2019; 14(8): e0221707.
27. Mazlin V, Peng X, Scholler J, **Irsch K**, Grieve K, Fink M, Boccara AC. Real-time, non-contact, cellular imaging and angiography of human cornea and limbus with common-path Full-field/SD OCT. *Nature Communications* 2020; 11(1): 1868.
28. Badon A, Barolle V, **Irsch K**, Boccara AC, Fink M, Aubry A. Distortion matrix concept for deep optical imaging in optical coherence microscopy. *Science Advances* (in press).

Publications in conference proceedings (* Corresponding author)

1. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. Spinning wave plate design for retinal birefringence scanning. *Proceedings of Society of Photo-Optical Instrumentation Engineers SPIE* 2009; 7169: 71691F1-12.
2. **Irsch K**, Guyton DL, Li N, Ying HS. Cyclovertical fusion patterns after vertical vergence adaptation in normals are different from those in some patients with superior oblique paresis. *Annals of the New York Academy of Sciences* 2011; 1233: Supplementary file. URL: <http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2011.06222.x/supinfo>
3. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. Wave-plate-enhanced retinal birefringence scanning for true foveal fixation detection. *Imaging and Applied Optics Technical Papers*, OSA Technical Digest (online) (Optical Society of America, 2012), paper IM3C.4.
4. **Irsch K***, Guyton DL, Park HS, Ying HS. Different mechanisms of motor fusion may differentiate between patients with true, versus masquerading, superior oblique paresis. *Transactions 34th European Strabismological Association* (in press).
5. **Irsch K***, Guyton DL, Ying HS. Objective analysis of the mechanism of vertical fusional vergence to classify "congenital superior oblique paresis" and guide surgical approach. *Transactions 35th European Strabismological Association* (in press).
6. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. A novel pediatric vision screener employing wave-plate-enhanced, retinal-birefringence-scanning-based strabismus detection and double-pass focus detection. *Imaging and Applied Optics*, J. Christou and D. Miller, eds., OSA Technical Digest (online) (Optical Society of America, 2013), paper ITh2D.5.
7. **Irsch K***, Borderie M, Grieve K, Plamann K, Laroche L, Borderie VM. Objective analysis of stromal light backscattering with full-field optical coherence tomographic microscopy shows potential to quantify corneal transparency. *Frontiers in Optics 2015*, OSA Technical Digest (online) (Optical Society of America, 2015), paper FW6A.6.
8. **Irsch K***, Gramatikov BI, Wu YK, Guyton DL. Development of a pediatric vision screening device for remote assessment of binocular fixation and focus using birefringence properties of the eye. *CLEO: Applications and Technology (CLEO_AT) 2016*, OSA Technical Digest (online) (Optical Society of America, 2016), paper ATu1O.7.

9. Mazlin V, Dalimier E, Grieve K, **Irsch K**, Sahel J, Fink M, Boccara C. Non-contact full-field optical coherence tomography: A step towards in-vivo cellular-level imaging of the human cornea. *Imaging and Applied Optics 2016*, OSA Technical Digest (online) (Optical Society of America, 2016), paper IM3F.3.
10. Mazlin V, Dalimier E, Grieve K, **Irsch K**, Sahel J, Fink M, Boccara C. Non-contact full-field optical coherence tomography: a novel tool for in vivo imaging of the human cornea. *Proceedings of Society of Photo-Optical Instrumentation Engineers SPIE 2017*; 10045: 1004519.
11. Barolle V, Badon A, Boccara C, Fink M, Aubry A, **Irsch K**. Matrix approach of eye optical imaging. *Imaging and Applied Optics 2017*, OSA Technical Digest (online) (Optical Society of America, 2017), paper MW3C.2.
12. Mazlin V, Peng X, Dalimier E, Grieve K, **Irsch K**, Sahel J, Fink M, Boccara C. In vivo imaging through the entire thickness of human cornea by full-field optical coherence tomography. *Proceedings of Society of Photo-Optical Instrumentation Engineers SPIE 2018*; 10474: 10474-27.
13. **Irsch K***, Lee S, Bose SN, Kang J. Motion-compensated optical coherence tomography using envelope-based surface detection and Kalman-based prediction. *Proceedings of Society of Photo-Optical Instrumentation Engineers SPIE 2018*; 10484: 10484-24.
14. Mazlin V, Xiao P, Scholler J, Grieve K, **Irsch K**, Sahel JA, Fink M, Boccara C. Ultra-high resolution full-field OCT (FFOCT) for cornea and retina. *Imaging and Applied Optics 2018*, OSA Technical Digest (online) (Optical Society of America, 2018), paper IM3B.1.
15. Gramatikov BI, **Irsch K**, Guyton DL. Integrating retinal birefringence scanning and optical coherence tomography for pediatric retinal imaging. *Imaging and Applied Optics 2018*, OSA Technical Digest (online) (Optical Society of America, 2018), paper IM3B.4.
16. Barolle V, Badon A, Cobus L, **Irsch K**, Boccara C, Fink M, Aubry A. Matrix approach of optical coherence tomography for in-depth imaging of biological tissues. *Imaging and Applied Optics 2018*, OSA Technical Digest (online) (Optical Society of America, 2018), paper JT5B.7.
17. Guyton DL, Gramatikov BI, **Irsch K**. The use of phase shift subtraction to obtain differential polarization measurements with a single detector and eliminate unwanted frequencies in periodic signals. *IEEE Transactions on Engineering in Medicine and Biology Conference (EMBC) 2018*, paper WeAT19.2.
18. **Irsch K***, Gramatikov BI, Guyton DL. Modeling and minimizing the effect of corneal birefringence in polarization-sensitive retinal scanning. *IEEE Transactions on Engineering in Medicine and Biology Conference (EMBC) 2018*, paper WeAT19.3.
19. Gramatikov BI, **Irsch K**, Guyton DL. Combining retinal birefringence scanning with long working distance OCT for pediatric imaging. *IEEE Transactions on Engineering in Medicine and Biology Conference (EMBC) 2018*, paper WeAT19.4.
20. **Irsch K**. Towards *in vivo* characterization and deep imaging of the cornea and beyond (*Latin America Optics & Photonics Congress (LAOP) 2018* OSA Technical Digest (online) (Optical Society of America, 2018), paper Tu5C.1.
21. Balondrade P, Barolle V, Ulysse N, Boccara C, Fink M, Aubry A, **Irsch K**. Matrix approach of full-field OCT for volumetric imaging of an opaque human cornea. *Advances in Optics for Biotechnology, Medicine and Surgery XVI*, E. Buckley, C. Moser, B. Pogue, D. Sampson, eds., ECI Symposium Series, (Engineering Conferences International, 2019), paper 37.
22. Bocheux R, Pernot P, Borderie V, Plamann K, **Irsch K***. Quantitative measures of corneal transparency, derived from objective analysis of stromal light backscattering with full-field optical coherence tomography. *Imaging and Applied Optics 2019*, OSA Technical Digest (online) (Optical Society of America, 2019), paper ITh2B.5.
23. Balondrade P, Barolle V, Cobus LA, **Irsch K**, Boccara C, Fink M, Aubry A. Matrix approach of Full-Field OCT for volumetric imaging of an opaque human cornea. *Imaging and Applied Optics 2019*, OSA Technical Digest (online) (Optical Society of America, 2019), paper ITh2B.3.
24. Bocheux R, Rivière B, Pernot P, Georgeon C, Borderie V, **Irsch K**, Plamann K. Objective and quantitative analysis of corneal transparency with clinical spectral-domain optical coherence tomography. *Proceedings of Society of Photo-Optical Instrumentation Engineers SPIE 2019*; 11073: 1107318.
25. Badon, A, Barolle V, Boccara AC, Fink M, **Irsch K***, Aubry A. Towards characterization and compensation of loss of anterior segment transparency. *IEEE Transactions on Engineering in Medicine and Biology Conference (EMBC) 2019*, paper ThC12.3.

Patents and inventions

1. Gramatikov BI, Guyton DL, **Irsch K**. Method and apparatus for detecting fixation of at least one eye of a subject on a target. Invention disclosure (JHU Ref. No. C11459) submitted to the Johns Hopkins University

- (JHU) Technology Transfer, 8 March 2011. U.S. Provisional Patent Application (No. 61/450,996) filed in the U.S. Patent and Trademark Office, 9 March 2011. U.S. Patent Application (No. 13/416,979) filed in the U.S. Patent Trademark Office, 9 March 2012; published, 13 September 2012 (Pub. No.: US 2012/0229768 A1); U.S. Patent (No. 8,678,592 B2) issued, 25 March 2014.
2. Gramatikov BI, Guyton DL, **Irsch K**. Eye fixation system and method. Invention disclosure (JHU Ref. No. C12166) submitted to the Johns Hopkins University Technology Transfer, 13 September 2012. U.S. Patent Application (No. 13/773,307) filed in the U.S. Patent Trademark Office, 21 February 2013; published, 21 August 2014 (Pub. No.: US 2014/0232989 A1). International Patent Application (No. PCT/US14/30139) filed under the Patent Cooperation Treaty (PCT), 14 February 2014; published, 28 August 2014 (Pub. No.: WO 2014/130372 A1).
 3. Ying HS, **Irsch K**, Guyton DL, Geary R, Gramatikov BI, Simons K. Method and apparatus for detection of microstrabismus and stability of fixation in at least on eye to screen for or diagnose amblyopia. Invention disclosure (JHU Ref. No. C12286) submitted to the Johns Hopkins University Technology Transfer, 21 December 2012.
 4. **Irsch K**, Guyton DL, Gramatikov BI. Apparatus and method for minimizing the influence of corneal birefringence on the analysis of eye fixation and focus using retinal birefringence scanning. Invention disclosure (JHU Ref. No. C12406) submitted to the Johns Hopkins University Technology Transfer, 14 March 2013. U.S. Provisional Patent Application (No. 61/793,350) filed in the U.S. Patent and Trademark Office, 15 March 2013. International Patent Application (No. PCT/US14/30139) filed under the Patent Cooperation Treaty (PCT), 17 March 2014; published, 18 September 2014 (Pub. No.: WO 2014/145383 A1); U.S. Patent Application (No. 14/776,763) filed in the U.S. Patent Trademark Office, 15 September 2015; published, 11 February 2016 (Pub. No.: US 2016/0038025 A1); U.S. Patent (No. 9,713,423 B2) issued, 25 July 2017.
 5. Gramatikov BI, Guyton DL, **Irsch K**. Eye tracking and gaze fixation detection systems, components and methods using polarized light. Invention disclosure (JHU Ref. No. C12498) submitted to the Johns Hopkins University Technology Transfer, 19 April 2013. U.S. Provisional Patent Application (No. 61/823,738) filed in the U.S. Patent and Trademark Office, 15 May 2013. International Patent Application (No. PCT/US14/38265) filed under the Patent Cooperation Treaty (PCT), 15 May 2014; published, 20 November 2014 (Pub. No.: WO 2014/186620 A1). U.S. Patent Application (No. 14/889,401) filed in the U.S. Patent Trademark Office, 5 November 2015; published, 24 March 2016 (Pub. No.: US 2016/0081547 A1); U.S. Patent (No. 9,737,209 B2) issued, 22 August 2017.
 6. Gramatikov BI, Guyton DL, **Irsch K**, Toth CA, Carrasco-Zevallos O, Izatt JA. Method and system for improving aiming during optical coherence tomography on young children by synchronization with retinal birefringence scanning. Invention disclosure (JHU Ref. No. C12709) submitted to the Johns Hopkins University Technology Transfer, 16 September 2013. U.S. Provisional Patent Application (No. 61/885,794) filed in the U.S. Patent and Trademark Office, 2 October 2013. International Patent Application (No. PCT/US14/058756) filed under the Patent Cooperation Treaty (PCT), 2 October 2014; published, 9 April 2015 (Pub. No.: WO 2015/051077 A1); U.S. Patent Application (No. 15/026,688) filed in the U.S. Patent Trademark Office, 1 April 2016; published, 18 August 2016 (Pub. No.: US 2016/0235292 A1); U.S. Patent (No. 10,004,397 B2) issued, 26 June 2018.
 7. Guyton DL, **Irsch K**, Ying HS, Gramatikov BI, Geary R, Tian J, Simons K. Eye alignment monitor and method. Invention disclosure (JHU Ref. No. C12905) submitted to the Johns Hopkins University Technology Transfer, 10 February 2014. U.S. Provisional Patent Application (No. 61/946145) filed in the U.S. Patent and Trademark Office, 28 February 2014. International Patent Application (No. PCT/US15/017920) filed under the Patent Cooperation Treaty (PCT), 27 February 2015; published, 3 September 2015 (Pub. No.: WO/2015/131009 A1). U.S. Patent Application (No. 15/121,814) filed in the U.S. Patent Trademark Office, 26 August 2016; published, 19 January 2017 (Pub. No.: US 2017/0014026 A1); U.S. Patent (No. 10,314,482 B2) issued, 11 June, 2019.
 8. Plamann K, **Irsch K**, Carminati R, Bocheux R. "Diagnostic optique quantitatif in situ de l'état pathologique de la cornée humaine." Invention disclosure (Ref. No. 2017DI0002) submitted to the École Polytechnique Office of Research Partnership and Intellectual Property (SR2PI), January 2018.
 9. Piestun R, **Irsch K**, Labouesse S, Gigan S. Imaging of the ocular fundus with speckle illumination. Invention disclosure (Ref. No. CU5046B) submitted to the University of Colorado Boulder Technology Transfer, 4 May 2019 (Sorbonne University Ref. No. X19063). U.S. Provisional Patent Application (No. 62/908,151) filed in the U.S. Patent and Trademark Office, 30 September 2019.
 10. **Irsch K**, Piestun R. Systems and methods to probe ocular structures. Invention disclosure (Ref. No. CU5145B) submitted to the University of Colorado Boulder Technology Transfer, 23 August 2019 (Sorbonne

University Ref. No. X19064). U.S. Provisional Patent Application (No. 62/930,816) filed in the U.S. Patent and Trademark Office, 5 November 2019.

Research funding (previous, current)

- | | |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09/2008 - 11/2014 | NIH R01 EY019347
Ocular Motor Adaptation in Health and Disease
Principal Investigator: Howard S. Ying, M.D., Ph.D.
Role: Co-Investigator |
| 07/2009 - 06/2010 | Knights Templar Eye Foundation Young Investigator Award
Optimized Retinal Birefringence Scanner for Strabismus Screening
Role: Principal Investigator |
| 04/2010 - 03/2013 | Hartwell Foundation Biomedical Research Award
Pediatric Vision Screening Instrument for Early Detection of Amblyopia ('Lazy Eye')
Principal Investigator: Boris I. Gramatikov, Ph.D.
Role: Co-Investigator |
| 06/2012 - 05/2013 | RPB Walt and Lilly Disney Award for Amblyopia Research
Detection of Microstrabismus and Stability of Fixation in Amblyopia
Principal Investigator: Howard S. Ying, M.D., Ph.D.
Role: Co-Investigator |
| 12/2012 - 11/2014 | Hartwell Foundation Biomedical Research Collaboration Award
Diagnosis and Management of Infant Retinal Disease: Fast Swept Source Optical Coherence Tomography Synchronized with Central Fixation
Principal Investigators: Cynthia A. Toth, M.D., Boris I. Gramatikov, Ph.D.
Role: Co-Investigator |
| 03/2017 - 02/2019 | Marie Skłodowska-Curie Individual Reintegration Fellowship
Towards an objective and quantitative Assessment of human Corneal Transparency (TACT)
Role: Principal Investigator |
| 10/2016 - 09/2019 | "Fondation de l'Avenir pour la recherche médicale" PhD scholarship award
TACT (Romain Bocheux, co-directed by Karsten Plamann and Kristina Irsch) |
| 09/2019 - 08/2021 | NIH R21 EY029584
Super-resolution imaging of the ocular fundus
Principal Investigators: Rafael Piestun, Ph.D., Kristina Irsch, Ph.D.
Role: Principal Investigator |

EDUCATIONAL ACTIVITIES AND TEACHING RESPONSIBILITIES

Educational publications (book chapters, monograph)

1. **Irsch K**, Guyton DL. Anatomy of Eyes. In: Li SZ and Jain AK (Eds.): Encyclopedia of Biometrics. 1st ed. Springer, New York, 2009; 11-16.
2. Gutmark R, Guyton DL, **Irsch K**. Prescribing Prisms. Focal Points: Clinical Modules for Ophthalmologists. American Academy of Ophthalmology, 2011; Vol. XXIX, No. 10 (Module 1 of 3).
3. **Irsch K**, Guyton DL. Eye Features and Anatomy. In: Li SZ and Jain AK (Eds.): Encyclopedia of Biometrics. 2nd ed. Springer, London, 2014; 1-7.
4. **Irsch K**. Physical Optics. In: 2018-2019 (major revision) Basic and Clinical Science Course, Section 3: Clinical Optics, American Academy of Ophthalmology, San Francisco, 2018.
5. **Irsch K**. Optical Instruments. In: 2018-2019 (major revision) Basic and Clinical Science Course, Section 3: Clinical Optics, American Academy of Ophthalmology, San Francisco, 2018.
6. **Irsch K**. Optical Principles of OCT. In: Albert D, Miller J, Azar D, Young LH (Eds.): Albert and Jakobiec's Principles and Practices of Ophthalmology. 4th ed. Springer, New York, 2020.

Educational publications (Book, textbook)

1. Brodie SE, Gupta PC, **Irsch K**, Jackson MJ, Mauger TF, Strauss L, Thall EH, Young JA (Eds.): 2018-2019 (major revision) Basic and Clinical Science Course, Section 3: Clinical Optics, American Academy of Ophthalmology, San Francisco, 2018.

Annual teaching activities in ophthalmic optics and clinical refraction

- 2012 - present Faculty, Ophthalmology residency lecture series: Ophthalmic Optics, The Wilmer Eye Institute, The Johns Hopkins University, Baltimore, Maryland.
- 2014 - present Faculty, First-year ophthalmology residency class orientation: Clinical refraction lectures and practicum, The Wilmer Eye Institute, The Johns Hopkins University, Baltimore, Maryland.
- 2015 - present Instructor, Ophthalmic optics lectures and clinical refraction practicum, as part of the Bachelor's Program in Orthoptics, Sorbonne University, Paris, France.

Basic Science Courses

- 2012 - 2019 Invited Course Instructor, Houston Basic Science Course: Ophthalmic Optics, University of Texas, Houston, Texas.
- 11/2013 Visiting Professor, Basic Ophthalmology Course: Optics lectures and clinical refraction practicum, King Khaled Eye Specialist Hospital (KKESH) and King Saud University, Riyadh, Saudi Arabia.
- 2015 - present Invited Course Instructor, Basic Science Course in Ophthalmology: Ophthalmic Optics, Columbia University Medical Center, New York, NY.
- 2016 - present Invited Course Instructor, Ophthalmic Bay Area Ophthalmology Course: Optics and Refraction, Byers Eye Institute, Stanford University School of Medicine, Stanford, California.

Review Courses

- 03/2013 Osler Ophthalmology Faculty, The Osler Institute – Ophthalmology Review Course: Optics & Refraction, Chicago, Illinois.
- 2014 - present Invited Course Instructor, Wills Eye Hospital Annual Ophthalmology Review Course: Optics and Refraction, Philadelphia, PA.
- 2016 - present Invited Course Instructor, Illinois Eye Review Course: Ophthalmic Optics, University of Illinois at Chicago College of Medicine, Chicago, Illinois.

Undergraduate teaching activities

- Fall 2007, Teaching Assistant, Basic Course in Physics and Optics & Optics and Microscopy for Medical
Fall 2008 Students, as part of the Mannheim Reformed Curriculum for Medicine (MaReCuM) Program, University of Heidelberg School of Medicine, Mannheim, Germany.

Graduate (Master) teaching activities

- Fall 2008 Teaching Assistant, Adaptive Optics Aberrometry and Wavefront Analysis & Confocal Laser Scanning Ophthalmoscopy course, as part of the International Master's Program in Medical Physics, University of Heidelberg and University Hospital in Mannheim, Germany.

Postgraduate and continuing education teaching activities

- 2016 - 2018 DIU & DES Refractive Surgery, Basic principles of laser-tissue interactions & Physical basis of corneal transparency and wavefront technology (adaptive optics), Quinze-Vingts National Eye Hospital, Paris, France.
- 2016 - present Course Organizer and Speaker, Basic principles of state-of-the-art ophthalmic instrumentation, European Association for Vision and Eye Research (EVER) Annual Meeting, Nice, France.

Mentoring and supervision

Dr. Irsch has co-supervised 3 post-doctoral research fellows, 2 post-doctoral clinical fellows, 8 graduate (3 PhD and 5 Master) students, 1 medical student, and 1 technician. She (solely) supervised 1 Master student, 1 undergraduate, and 1 high school student. She is currently involved in the co-supervision of 1 post-doctoral research fellow, 2 PhD students, including one of whom she is the official co-advisor:

- Maëlle Vilbert. Graduate student in Physics (Optics): École doctorale de l'Institut Polytechnique de Paris. Thesis project "Diagnostic optique *in vivo* de la transparence cornéenne," co-directed by Karsten Plamann and Kristina Irsch and funded by "Allocation doctorale de l'École Polytechnique."

Participation in thesis and dissertation committees

- 09/2019 Viacheslav Mazlin; PhD thesis "Full-field optical coherence tomography for non-contact cellular-level resolution in vivo human corneal imaging" in Physics from the University PSL prepared at ESPCI Paris, France (Doctoral school no. 564 "Physique en Île-de-France"); Role: Examiner.
- 09/2019 Romain Bocheux; PhD thesis "Caractérisation objective et quantitative de la transparence cornéenne par OCT plein champ et microscopie holographique" in Physics from the University Paris-Saclay

prepared at École polytechnique, Palaiseau, France (Doctoral school no. 573 “Interfaces : approches interdisciplinaires, fondements, applications et innovation”); Role: Thesis co-advisor.

ORGANIZATIONAL ACTIVITIES

Evaluation of research projects and travel grants

- 2011 Jean Bennett Memorial Travel Grant Program Selection Committee, Optical Society of America (OSA)
- 2011 OSA Robert S. Hilbert Memorial Student Travel Grants Selection Committee
- 2015 OSA Imaging Systems and Applications (IS) best student paper award committee
- 2017 Remote Evaluator, Horizon 2020 “Novel ideas for radically new Future and Emerging Technologies” (FET) – Open Research and Innovation Action (RIA).
- 2018 Judge for Student Grand Challenge: The Optical Systems of the Future, Optical Society of America (OSA)

Activities or participation in scientific networks, advisory committees, and review groups

- 2010 - 2015 OSA Member Advisory Network Group, Optical Society of America (OSA)
- 2013 Invited Oral Board Examiner (Ophthalmic Optics) for King Saud University Ophthalmology Fellowship Oral Examination, held at King Abdulaziz University Hospital, Riyadh, Saudi Arabia.
- 2013 - present Member of Expert Board, International Journal of Ophthalmology

Conference organizer, session chair

- 2012 - present Program Committee for Optical Society of America (OSA) Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress.
- 2013 Session Co-Chair, “Medical II,” OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Arlington, Virginia.
- 2015 Moderator, Idiopathic intracranial hypertension and papilledema poster session, Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting, Denver, Colorado.
- 2015 Program Chair (Organizer) of OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Arlington, Virginia.
- 2015 Session Chair, “Optogenetics, vision restoration, and retinal implants I,” OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Arlington, Virginia.
- 2016 Moderator, “Fixational eye movements – Minisymposium,” ARVO Annual Meeting, Seattle, Washington.
- 2016 Session Presider, “Medical Technology & Devices,” Conference on Lasers and Electro-Optics (CLEO), San Jose, California.
- 2016 General Chair (Organizer) of OSA Imaging Systems and Applications (IS) Topical Meeting, Imaging OSA Imaging and Applied Optics Congress, Heidelberg, Germany.
- 2016 Session Presider, “Keynote Session,” “Medical and ophthalmic applications,” and “Computational & Novel Imaging,” OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Heidelberg, Germany.
- 2016 - present Course Organizer, Basic principles of state-of-the-art ophthalmic instrumentation, European Association for Vision and Eye Research (EVER) Annual Meeting, Nice, France.
- 2017 Session Presider, “Imaging Close to Heart,” OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, San Francisco, California.
- 2017 Session Presider, “Free Paper and Rapid Fire Session (Inherited Retinal Dystrophies),” 43rd Annual Conference of the European Paediatric Ophthalmological Society (EPOS). Institute of Mathematics, University of Oxford, United Kingdom.
- 2018 Program Chair (Organizer) of OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Orlando, Florida.
- 2018 Session Presider, “Microscopy I: Super-resolution & Illumination Techniques,” OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Orlando, Florida.

- 2018 Session Presider, "Session 8 (Cystinosis, Neurofibromatosis, Retinal imaging)," 44th Annual Conference of the European Paediatric Ophthalmological Society (EPOS), Budapest, Hungary.
- 2019 General Chair (Organizer) of OSA Imaging Systems and Applications (IS) Topical Meeting, Imaging OSA Imaging and Applied Optics Congress, Munich, Germany.
- 2019 Session Presider, "Optical Coherence Tomography" and "Biophotonics," OSA Imaging Systems and Applications (IS) Topical Meeting, OSA Imaging and Applied Optics Congress, Munich, Germany.
- 2020 Session Presider, "Biophotonics I," OSA Imaging Systems and Applications (IS) Topical Meeting & OSA Computational Optical Sensing and Imaging (COSI) Topical Meeting (joint session), OSA Imaging-Sensing 2020 Virtual Congress.

Editorial board activities and appointments

- 2016 Guest Editor: Feature Issue on Modern Imaging, Applied Optics
- 2016 - present Editorial Committee, Section 3: Clinical Optics, Basic and Clinical Science Course (BCSC), American Academy of Ophthalmology (AAO)

Participation in the collective life of the laboratory / Institutional responsibilities

- 2011 - 2014 Organization of Five-o'clock Afternoon Research Meeting (FARM), The Wilmer Eye Institute at The Johns Hopkins University School of Medicine, Baltimore, Maryland.

RECOGNITIONS

Awards and honors

- 2005 - 2006 Baden-Württemberg-STIPENDIUM. Scholarship of the Landesstiftung Baden-Württemberg for study and research abroad.
- 2006 Study Abroad Scholarship provided by the University of Heidelberg School of Medicine.
- 2009 Winner of the Medical category in the 2008 "Create the Future" Design Contest sponsored by NASA Tech Briefs magazine and Dassault Systèmes SolidWorks Corporation.
- 2009 - 2010 The Pediatric Ophthalmology and Strabismus Wilmer Research Grant Award.
- 2009 - 2010 Knights Templar Eye Foundation Young Investigator Award.
- 2014 Winner of the 2014 EVER Congress best section poster prize.
- 2015 Winner of the EVER 2015 travel award for best section abstract.
- 2016 Marie Skłodowska-Curie Individual Reintegration Fellowship Award (2017-2019)

Invited talks / lectures

- 03/2012 Wave-plate-enhanced retinal birefringence scanning. Metropolitan Biophotonics Symposium 2012, Baltimore, Maryland.
- 09/2013 Detecting eye fixation and alignment using polarization properties of the retina. Laboratoire d'Études Spatiales et d'Instrumentations en Astrophysique (LESIA), Observatoire de Paris, Paris, France.
- 09/2013 Remote and calibration-free detection of eye fixation using polarization properties of the retina. University of Colorado Computational Optical Sensing and Imaging (COSI) Seminar Series, Boulder, Colorado.
- 11/2013 Visiting Professor. Detection of eye fixation and alignment using polarization properties of the retina. King Khaled Eye Specialist Hospital (KKESH) and King Saud University, Riyadh, Saudi Arabia.
- 05/2014 Remote and calibration-free detection of eye fixation using polarization properties of the retina. Haute Résolution Angulaire et Apéro (HRApéro) seminar, ONERA (Office National d'Études et de Recherches Aérospatiales) – the French Aerospace Lab, Châtillon, France.
- 06/2014 Interocular fixation instability: a sensitive measure for amblyopia? Department of Ophthalmology, Erasmus University Medical Center Rotterdam, Rotterdam, Netherlands.
- 06/2014 Remote and calibration-free detection of eye fixation and alignment using polarization properties of the retina. Department of Ophthalmology, Erasmus University Medical Center Rotterdam, Rotterdam, Netherlands.
- 11/2014 Adaptive Optics. Diagnostic Techniques symposium, American Association for Pediatric Ophthalmology and Strabismus (AAPOS) – Japanese Association of Pediatric Ophthalmology (JAPO) – Japanese Association of Strabismus and Amblyopia (JASA) Joint Meeting, Kyoto, Japan.

- 06/2015 Development of a pediatric vision screening device for remote assessment of binocular fixation and focus using polarization optics of the eye. California Innovation Center of Ricoh Innovations, Menlo Park, California.
- 07/2015 Remote detection of binocular fixation and focus using polarization optics and retinal birefringence properties of the eye. Stanford Center for Image Systems Engineering (SCIEN) Colloquium, Stanford University, Stanford, California.
- 07/2015 Guest lecturer. Physical and adaptive optics, Ophthalmic Bay Area Ophthalmology Course (formerly the Basic Science Course in Ophthalmology) – Foundations of Clinical and Visual Science, Byers Eye Institute, Stanford University School of Medicine, Stanford, California.
- 12/2015 The use of retinal polarization properties to remotely detect strabismus and defocus. Paediatric and Adult Strabismus Symposium, Oxford Eye Hospital, Oxford, United Kingdom.
- 12/2015 How fusional adaptation can change the results of the diagnostic Bielschowsky head tilt test, and may also help guide treatment of superior oblique paresis. Paediatric and Adult Strabismus Symposium, Oxford Eye Hospital, Oxford, United Kingdom.
- 05/2016 Disconjugacy of fixational eye movements to detect amblyopia. Mini-symposium on fixational eye movements. Association for Research in Vision and Ophthalmology (ARVO) Annual Meeting, Seattle, Washington.
- 06/2016 Development of a pediatric vision screening device for remote assessment of binocular fixation and focus using birefringence properties of the eye. Conference on Lasers and Electro-Optics (CLEO), San Jose, California.
- 05/2017 Full-field optical coherence tomographic microscopy towards *in-vivo* characterization and quantitative imaging of the cornea. The Bio-Optics Lab, Wellman Center for Photomedicine at Massachusetts General Hospital and Harvard University Medical School, Cambridge, Massachusetts.
- 09/2017 Adaptive Optics. 43rd Annual Conference of the European Paediatric Ophthalmological Society (EPOS). Institute of Mathematics, University of Oxford, United Kingdom.
- 09/2017 Introduction – What is adaptive optics? Neuro-ophthalmic applications of eye and brain imaging: from basics to the latest. 13th European Neuro-Ophthalmology Society (EUNOS) meeting, Budapest, Hungary.
- 09/2017 Seeing the light: A perspective from a junior scientist on her journey from psychology to physics to ophthalmic research. Women in EVER (WIE) session, European Association for Vision and Eye Research (EVER) Annual Meeting, Nice, France.
- 07/2018 Modeling and minimizing the effect of corneal birefringence in polarization-sensitive retinal scanning. 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Honolulu, Hawaii.
- 09/2018 Basic principles of state-of-the art ophthalmic imaging technology. 44th Annual Conference of the European Paediatric Ophthalmological Society (EPOS), Budapest, Hungary.
- 10/2018 Towards *in-vivo* characterization and deep imaging of the cornea and beyond. Optics, nanostructures & bioengineering lab, Department of Electrical and Computer Engineering and Department of Physics, Boulder, Colorado.
- 11/2018 Towards *in-vivo* characterization and deep imaging of the cornea and beyond. OSA Latin America Optics & Photonics Conference (LAOP), Lima, Peru.
- 07/2019 Computational ocular microscopy – Quantitative assessment of corneal transparency. Computational Optical Microscopy (COM) workshop, Prague, Czech Republic.
- 07/2019 Towards characterization and compensation of loss of anterior segment transparency. 41st Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Berlin, Germany.
- 11/2019 Computational ocular microscopy – Characterization and compensation of corneal transparency loss. Imaging Science Seminar Series, University of Colorado-Boulder, Boulder, Colorado.
- 02/2020 Computational ocular microscopy – Quantitative assessment of corneal transparency. SPIE Photonics West, BIOS Conference: Adaptive Optics and Wavefront Control for Biological Systems VI (BO505), San Francisco, California.
- 02/2020 The physical principles behind the different OCT domains. 24th ESCRS Winter Meeting, Marrakech, Morocco.

Invited panel, interview

- Interview, in the form of Centennial Authentic Moments (CAM) videos (e.g.: http://www.osa.org/en-us/100/osa_stories/kristina_irsch/?utm_source=april2017&utm_medium=email&utm_campaign=member-newsletter), at the OSA's annual meeting, Frontiers in Optics (FiO), Rochester, NY, October 18, 2016, as part of the 100th anniversary of the Optical Society of America (OSA).
- Invited Panelist at "The Medical Imaging Revolution" hosted by the Optical Society of America, Washington, DC, June 14, 2017, through the *Speakeasy Science Program* (http://www.osa.org/en-us/the_optical_society_blog/2017/june_2017/medical_imaging_speakeasy_revolution_through_opti/). The program, funded by a grant from the American Institute of Physics (AIP) and in partnership with the American Physical Society (APS), strives to increase communication between scientists and the public. The panel focused on new optical techniques and advances in biomedical imaging and how it will affect the medical industry for years to come.