

CURRICULUM VITAE (Summary)

Prof. Pablo Artal

Personal data

Surname: **ARTAL**

First name: **PABLO**

Current position: Full Professor of Optics

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Bio-sketch

Pablo Artal received his Ph.D. degree in Physics from the University Complutense of Madrid, and was a post-doctoral fellow at the Institut d'Optique, Orsay, France and a senior researcher at the Instituto de Optica in Madrid. He is since 1994 full Professor of Optics at the University of Murcia, Spain. He spent several periods doing collaborative research in laboratories in Europe, Australia and USA. He is a fellow member of the OSA, ARVO (gold category) and EOS. He received the prestigious 2013 Edwin H Land medal award in recognition of his scientific contributions to the advancement of diagnostic and correction alternatives in visual optics. He is the recipient of the exclusive "ERC advanced grant" in 2013. He has published more than 160 reviewed papers that received 6500 citations (h-index: 43), presented more than 150 invited talks in international meetings and around 120 seminars in different research institutions. He is also a co-inventor of 20 international patents in the field of Optics and Ophthalmology. He has pioneered a number of highly innovative advances in the methods for studying the optics of the eye and has contributed substantially to our understanding of the factors that limit human visual resolution. Dr. Artal is a pioneer in exploring the human eye with new technologies and designed new ophthalmic corrections. Several of his proposed solutions and instrument are currently in use in the clinical practice. For example, he co-invented intraocular lenses correcting for the corneal spherical aberration that provides improved quality of vision to millions of patients over the world. Dr. Artal is the founder of Voptica SL a spin-off company developing the concept he invented of adaptive optics vision analyzers. He has been the mentor of many graduate and post-doctoral students. His personal science blog is followed by readers, mostly graduate students and fellow researchers, from around the world. He has been editor of the Journal of the Optical Society of America A and the Journal of Vision.

CV's summary details

Education (Academic Record):

1984: "Grado de Licenciado en Física" (MSc, equivalent in Physics), Universidad de Zaragoza, Spain.

1988: "Doctor en Ciencias Físicas" (Ph.D. in Physics), Universidad Complutense de Madrid, Spain. (Ph.D. advisor: Dr. Javier Santamaría).

Career (Research Record)

1983-84: Laboratory Assistant. Optics Department, Universidad de Zaragoza, Spain.

1985-88: Fellow of the Spanish Ministry of Science. Instituto de Optica (CSIC), (National Research Council), Madrid, Spain.

1988: Visiting scholar. Physiological Laboratory, University of Cambridge, UK. (F.W. Campbell's laboratory).

1989-September 1990: Post-doctoral fellow. Institut d'Optique, Universite de Paris-Sud-CNRS, Orsay, France. (P.Chavel's laboratory).

October 1990-February 1994: Senior Scientific Researcher (permanent position). Instituto de Optica, Consejo Superior de Investigaciones Cientificas (CSIC), Madrid, Spain.

1998-99: Visiting professor. Center for Visual Science, University of Rochester (USA).

2011-12: Visiting professor. Brien Holden Vision Institute. University of New South Wales, Sydney, Australia.

March 1994-present: Full Professor of Optics (permanent (tenured) position). Laboratorio de Optica, Departamento de Física, Universidad de Murcia, Spain.

Short-term (over a month) visiting professor appointments:

March 1993: Visiting scholar. University of Newcastle, UK.

October 1994: Visiting professor. University of Michigan, USA.

December 1996: Visiting professor. Dept. of Physics, University of Heidelberg, Germany.

July-August 2000: Visiting professor. Queensland Univ. of Technology, Brisbane, Australia.

July-August 2003: Visiting professor. National University Ireland, Galway, Ireland.

Short periods spent at many University and research laboratories in Spain, Europe USA, Australia and Latin America.

Specialization

Optics (Physics), Physiological and Visual Optics; Vision; Image Processing; Adaptive Optics, Biomedical Optics, Bio-photonics, Ophthalmic instrumentation.

Funding

Since 1994, Prof. Artal obtained more than 6 million € of funding from different external agencies and privates companies (more than 2 million €). The following agencies and companies funded Dr. Artal research during the last years: Fundación Seneca (Murcia Region Government), Spanish Ministry of Education and Science; European Union, NATO, Abbott Medical Optics (AMO) (Holland & USA), CIBA Vision (USA), ESSILOR (France), Calhoun Vision (USA), Allergan (USA).

At present, Prof. Artal's funding includes: Spanish Ministry for Science grants: 2010-2013 (600000 €); Murcia Region grant: 2008-2013 (300000 €); EU RTN: 2012-2014 (300000 €). In 2013, he was awarded with the prestigious "Advanced grant" of the European Research Council (2400000 €).

Main achievements

- 1) Over 160 publications in international scientific journals.
- 2) More than 650 citations in Web of Science, ISI (>10800 in Google Scholar).
- 3) H-index = 43 (43 publications with 43 or more citations) (56 in Google Scholar).
- 4) Over 650 communications presented in international conferences.
- 5) Over 150 invited presentations in international meetings and conferences.
- 6) Over 120 invited seminars in Universities and research institutions.
- 7) Over 20 national and international patents (and patent applications). Many of the patents have a family associated for different countries and territories.
- 8) Director/supervisor of 22 PhD students (completed thesis) and 8 more now in progress.
- 9) Co-founder of two spin-off companies (Voptica SL & Visiometrics SL).

Miscellaneous

Spanish National Prize 1989 for research in Optics.

Organizer of five international short-courses and research symposiums.
General Secretary of the Spanish Optical Society (SEDO) (91-94).
Associated Dean, Science Faculty, Universidad de Murcia, Spain (94-00).
Editor of the Journal of the Optical Society of America A (2006-2011).
Editor of the Journal of Vision (2004-present).
Editor of Ophthalmic and Physiological Optics (2008-present).
Editor of the Journal of the European Optical Society (2006-2009).
Member of the external advisory board of the NSF-Center for Adaptive Optics (UCSC).
Member of the scientific advisory board on optics for Abbott Medical Optics (2010-present).
Member of the scientific advisory board of Allergan (2012).
Director of the Physics Department (University of Murcia). 2001-2003.
Elected member (“Académico”) of the “Academia de Ciencias de la Región de Murcia”. 2003
President of the “Academia de Ciencias de la Región de Murcia”. 2010- .
Chair of the Physics grants reviewing panel in the Spanish Ministry of Education (2004-6).
Director of the Research Institute in Optics and Nanophysics (CiOyN), University of Murcia (2006-)
Organizer (chair) of several international meetings (i.e.; EEIII, 2011, 8th IWAO)
Fellow of the Optical Society of America since 1999.
Fellow of the Association for Research in Vision and Ophthalmology (ARVO), 2009 (Inaugural class) and gold class (2013).
Fellow of the European Optical Society since 2014.
Edwind H Land medal 2013 recipient.

Pablo Artal's list of publications
(proceedings and abstracts NOT INCLUDED)

1. J. Santamaría, P. Artal and J. Bescós. "Determination of the point spread function of human eyes using a hybrid optical-digital method" *J. Opt. Soc. Am. A*, 4, 1109-14 (1987).
2. F. Soria, P. Artal, J. Bescós and K. Heinemann. "Digital image processing of nanometer size metal particle on amorphous substrates" *Ultramicroscopy*, 24, 19-26 (1988).
3. P. Artal, J. Santamaría and J. Bescós. "Retrieval of the wave aberration of human eyes from actual point spread function data" *J. Opt. Soc. Am. A*, 5, 1201-06 (1988).
4. P. Artal, J. Santamaría and J. Bescós. "The phase transfer function of the human eye and its influence on point spread function and wave aberration" *J. Opt. Soc. Am. A*, 5, 1791-95 (1988).
5. P. Artal, J. Santamaría and J. Bescós. "Optical-digital procedure for the determination of the retinal image of a point test in white light" *Opt. Eng.* 28, 687-90 (1989).
6. P. Artal, M. Avalos-Borja, F. Soria, H. Poppa and K. Heinemann. "Image processing enhancement of high resolution TEM micrographs of nanometer size metal particles" *Ultramicroscopy*, 30, 405-16 (1989).
7. P. Artal and R. Navarro. "High-resolution imaging of the living human fovea: measurement of the intercenter cone distance by speckle interferometry" *Optics Letters*, 14, 1098-1100 (1989).
8. P. Artal "Incorporation of directional effects of the retina into computations of the modulation transfer function of human eyes" *J. Opt. Soc. Am. A*, 6, 1941-44 (1989).
9. P. Artal "Calculations of two-dimensional foveal retinal images in real eyes" *J. Opt. Soc. Am. A*, 7, 1374-81 (1990).
10. C. Gonzalo, J. Bescós, L. R. Berriel-Valdós and P. Artal "Optical-digital implementation of the Wigner distribution function: use in space variant filtering of real images" *Appl. Opt.* 29, 2569-75 (1990).
11. J. I. Prydal, P. Artal, H. Woon and F. W. Campbell "Study of human tear film thickness and structure using laser interferometry" *Inves. Ophthalmol. Vis. Sci.* 33, 2006-2011 (1992).
12. P. Artal and R. Navarro "Simultaneous measurement of two point-spread functions in the human eye at different locations across the fovea" *Appl. Opt.* 31, 3646-3746 (1992).
13. R. Navarro, P. Artal and D. R. Williams "Modulation transfer of the human eye as a function of eccentricity" *J. Opt. Soc. Am. A*, 201-212 (1993).
14. P. Artal "Method to estimate the human pupil size from the bandwidth of coherent retinal images" *Appl. Opt.*, 32, 4212-4217 (1993).
15. P. Artal, M. Ferro, I. Miranda and R. Navarro "Effects of aging in retinal image quality" *J. Opt. Soc. Am. A*, 10, 1656-1662 (1993).
16. R. Navarro, M. Ferro, P. Artal and I. Miranda "Modulation transfer function of eyes implanted with intraocular lenses" *Appl. Opt.* 32, 6359-6367 (1993).
17. P. Artal and R. Navarro "Monochromatic modulation transfer function of the human eye for different pupil diameters: an analytical expression" *J. Opt. Soc. Am. A*, 11, 246-249 (1994).
18. P. Artal, S. Marcos, R. Navarro and D. R. Williams "Odd aberrations and double pass measurements of retinal image quality" *J. Opt. Soc. Am. A*, 12, 195-201 (1995).
19. P. Artal, S. Marcos, R. Navarro, I. Miranda and M. Ferro. "Through focus image quality in bifocals IOLs". *Opt. Eng.* 772-779 (1995).

20. P.Artal, A.M. Derrington and E.Colombo "Refraction, aliasing and the absence of motion reversals in peripheral vision" *Vision Res* 35, 939-947 (1995).
21. P.Artal , I.Iglesias, N.Lopez-Gil and D.G.Green "Double-pass measurements of the retinal image quality with unequal entrance and exit pupils sizes and the reversibility of the eye's optical system" *J.Opt.Soc.Am.A.* 12, 2358-2366 (1995).
22. P.Artal "Advances in double-pass measurements of the retinal image quality" *Optics and Photonics News*, 20, 36, (1995).
23. S. Marcos, R. Navarro, P. Artal "Coherent imaging of the cone mosaic in the living human eye" *J.Opt.Soc.Am.A.* 13,897-905 (1996).
24. D. R. Williams, P. Artal, R. Navarro, M. J. McMahon, D. H. Brainard "Off-axis optical quality and retinal sampling in the human eye" *Vision Res.*36, 1003-1114 (1996).
25. P. Artal, S.Marcos, I.Iglesias and D.G.Green "Optical Modulation transfer and contrast sensitivity with decentered pupils in the human eye" *Vision Res.*36, 3575-3586 (1996).
26. N.Lopez-Gil and P. Artal "Comparison of double pass estimates of the retinal image quality obtained with green and near infrared light" *J.Opt.Soc.Am.A.*14, 961-971 (1997).
- 27.I.Iglesias, N.Lopez-Gil and P. Artal "Reconstruction of the ocular PSF from a pair of double pass images by phase retrieval techniques" *J.Opt.Soc.Am.A.* 15, 326-339 (1998).
28. P.Artal, P.Herrerros, C.Muñoz and D.G.Green. "Retinal image quality in the rodent eye". *Visual Neuroscience* 15, 597-605 (1998).
29. N.López-Gil, I.Iglesias and P. Artal. "Retinal image quality in the human eye as a function of accommodation ". *Vision Res.* 38, 2897-2907 (1998).
30. I.Iglesias, E.Berrio and P.Artal "Estimates of the ocular wave aberration from pairs of double pass retinal images". *J.Opt.Soc.Am.A.* 15, 2466-2476 (1998).
31. F.Vargas and P.Artal "Phasor averaging for wavefront correction with liquid crystal spatial light modulators" *Opt. Comm.* 152, 233-238 (1998).
32. A.Guirao and P.Artal "Contribution of corneal and lens to the aberrations of the human eye". *Opt.Lett.* 23, 1713-1715 (1998).
33. F.Vargas, P.Prieto and P.Artal "Correction of the aberrations in the human eye with a liquid crystal spatial light modulator: limits to the performance" *J.Opt.Soc.Am.A.* 15, 2552-2562 (1998).
34. A.Guirao and P.Artal "Off-axis monochromatic aberrations estimated from double pass measurements in the human eye" *Vision Res.* 39, 207-217 (1999).
35. A.Guirao, C.Gonzalez, M.Redondo, E.Geraghty, S.Norrby and P.Artal "Average optical performance of the human eye as a function of age in a normal population" *Inv.Opth.Vis.Sci.* 40, 203-213 (1999).
36. J.Bueno and P.Artal. "Double-pass imaging polarimeter in the eye" *Opt.Lett.* 24, 64-66 (1999).
37. A.Guirao and P.Artal. "Corneal wave-aberrations from videokeratography: accuracy and limitations of the procedure" *J.Opt.Soc.Am.A.* 17, 955-965 (2000).
38. Vargas-Martín, S. Goelz and P.Artal. "Analysis of the performance of the Hartmann-Shack sensor in the human eye" *J.Opt.Soc.Am.A.* 17(8):1388-98 (2000).

39. A.Guirao, M.Redondo and P.Artal "Corneal aberrations of the human eye as a function of age " J.Opt.Soc.Am.A. 17, 1697-1702 (2000).
40. P.Artal "Understanding aberrations using double pass techniques" J Refract Surg.16(5):S560-2 (2000).
41. I.Iglesias and P.Artal "Deconvolution of retinal images from wave-front data". Opt.Lett. 25, 1804-1806 (2000).
42. J.Bueno and P.Artal "Polarization and retinal image quality estimates in the human eye". J.Opt.Soc.Am.A. 18, 489- 496 (2001).
43. H.Hofer, P.Artal, B.Singer, J.L.Aragon and D.R.Williams. "Dynamics of the eye wave aberrations". J.Opt.Soc.Am.A. 18, 497-506 (2001).
44. E. Fernández, I.Iglesias and P.Artal "Closed loop adaptive optics in the human eye". Opt.Lett. 26, 746-748 (2001).
45. P.Artal, A. Guirao, Berrio, E., & Williams, D. R. "Compensation of corneal aberrations by the internal optics in the human eye". Journal of Vision, 1(1), 1-8, (2001).
46. M. P. Cagigal, V. F. Canales, J. F. Castejón-Mochón, P. M. Prieto, N. López-Gil, P. Artal, "Statistical description of the wave front aberration in the human eye" Opt.Lett. 27 (2002).
47. P. Artal, E. Berrio, A. Guirao, P. Piers. "Contribution of the cornea and internal surfaces to the change of ocular aberrations with age" J. Opt. Soc. Am. A, 19, 137-143 (2002).
48. E.J. Fernandez, S.Manzanera, P.Piers, P. Artal. "Adaptive optics visual simulator". J. Refract. Surg. 18(5):S634-8 (2002).
49. N. Lopez, J. Castejon, A. Benito, J.M. Marin, G. Lo-a-Foe, G. Marin, B. Fermigier, D. Renard, D. Joyeux, N. Chateau, P. Artal "Aberration generation by contact lenses with aspheric and asymmetric surfaces". J. Refract. Surg. 18(5): S603-9 (2002).
50. P.Artal, EJ Fernandez, S. Manzanera "Are optical aberrations during accommodation a significant problem for refractive surgery?" J. Refract. Surg. 18(5):S563-6. (2002).
51. E. Villegas, C. Gonzalez, B. Bourdoncle, T. Bonnin, P. Artal, "Correlation between optical and psychophysical parameters as a function of defocus." Optom. Vis Sci. 79(1):60-7. (2002).
52. A. Guirao, M. Redondo, E. Geraghty, P. Piers, S. Norrby, P. Artal. "Corneal optical aberrations and retinal image quality in patients in whom monofocal intraocular lenses were implanted" Arch Ophthalmol., 120(9):1143-51 (2002).
53. J. Castejon-Mochon, N.Lopez, A. Benito, P. Artal. "Ocular wave-front aberration statistics in a normal young population." Vision Res. 42(13):1611-7 (2002).
54. D.A. Atchison, D.H. Scott, N.C. Strang, P. Artal. "Influence of Stiles-Crawford apodization on visual acuity". J Opt Soc Am A, 19(6):1073-83 (2002).
55. I. Iglesias, R. Ragazzoni, Y. Julien, P. Artal. ""Extended source pyramid wave-front sensor for the human eye" Opt. Express, 10, 419-428 (2002).
56. A. Seidemann, F. Schaeffel, A. Guirao, N. Lopez, P. Artal. "Peripheral refractive errors in myopic, emmetropic, and hyperopic young subjects" J Opt Soc Am A, 19: 2363-2373 (2002).
57. E. A. Villegas, P. Artal, "Spatially resolved wavefront aberrations of ophthalmic progressive-power lenses in normal viewing conditions" Optom. Vis. Sci., 80, 106-114 (2003).
58. E. J. Fernández, P. Artal, "Membrane deformable mirror for adaptive optics: performance limits in visual optics" Opt. Express, 11, 1056-1069 (2003).
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59. JM Bueno, E Berrio, P Artal, "Aberro-polariscope for the human eye" *Opt.Lett.* 2, 1209-1211 (2003).
60. B. Vohnsen, I. Iglesias, P. Artal "Directional Imaging of the Retinal Cone Mosaic" *Opt. Lett.*, 29, 968-970 (2004).
61. P. Artal, L. Chen, E. J. Fernández, B. Singer, S. Manzanera, D. R. Williams, "Neural adaptation for the eye's optical aberrations" *J. Vis.*, 4, 281-287 (2004).
62. J. M. Bueno, E. Berrio, M. Ozolinsh, P. Artal, "Degree of polarization as an objective method of estimating scattering" *J. Opt. Soc. Am. A*, 21, 1316-1321 (2004).
63. A. Guirao, J. Tejedor, P. Artal, "Corneal Aberrations before and after Small-Incision Cataract Surgery" *Invest. Ophthalmol. Vis. Sci.*, 45, 4312-4319 (2004).
64. P. A. Piers, E. J. Fernández, S. Manzanera, S. Norrby, P. Artal, "Adaptive optics simulation of intraocular lenses with modified spherical aberration" *Invest. Ophthalmol. Vis. Sci.*, 45, 4601-4610 (2004).
65. E. J. Fernández, A. Unterhuber, P. M. Prieto, B. Hermann, W. Drexler, P. Artal, "Ocular aberrations as a function of wavelength in the near infrared measured with a femtosecond laser" *Opt. Express*, 13, 400-409 (2005).
66. V. Nourrit, B. Vohnsen, P. Artal. "Blind deconvolution for high-resolution confocal scanning laser ophthalmoscopy" *J. Opt. A: Pure Appl. Opt.*, 7, 585-592 (2005).
67. E. J. Fernández, P. Artal, "Study on the effects of monochromatic aberrations in the accommodation response by using adaptive optics" *J. Opt. Soc. Am. A*, 22, 1732-1738 (2005).
68. B. Vohnsen, I. Iglesias, and P. Artal "Guided light and diffraction model of human-eye photoreceptors," *J. Opt. Soc. Am. A* 22, 2318-2328 (2005).
69. E. J. Fernández, B. Povazay, B. Hermann, A. Unterhuber, H. Sattmann, P. M. Prieto, R. Leitgeb, P. Ahnelt, P. Artal, W. Drexler "Three-dimensional adaptive optics ultrahigh-resolution optical coherence tomography using a liquid crystal SLM" *Vis. Res.*, 45, 3432-3444 (2005).
70. J. M. Bueno, E. Berrio, P. Artal "Corneal polarimetry after LASIK refractive surgery" *J. Biomed. Opt.*, 11, 014001 (2006).
71. F. Díaz-Doutón, A. Benito, J. Pujol, M. Arjona, J.L. Güell, P. Artal "Comparison of the Retinal Image Quality with a Hartmann-Shack Wavefront Sensor and a Double-Pass Instrument" *Invest. Ophthalmol. Vis. Sci.*, 47, 1710-1716 (2006).
72. E. J. Fernández, A. Unterhuber, B. Považay, B. Hermann, P. Artal, W. Drexler, "Chromatic aberration correction of the human eye for retinal imaging in the near infrared" *Opt. Express*, 14, 6213-6225 (2006).
73. S. Drobczynski, J.M. Bueno, P. Artal, H. Kasprzak "Transmission imaging polarimetry for a linear birefringent medium using a carrier fringe method" *Appl. Opt.*, 45, 5489-5496 (2006).
74. R. Blendowske, E.A. Villegas, P. Artal "An Analytical Model Describing Aberrations in the Progression Corridor of Progressive Addition Lenses" *Optom. Vis. Sci.*, 83, 666-671 (2006).
75. E.A. Villegas, P. Artal "Visual Acuity and Optical Parameters in Progressive-Power Lenses" *Optom. Vis. Sci.*, 83, 672-681 (2006).
76. J. Tabernero, P. Piers, A. Benito, M. Redondo, P. Artal "Predicting the Optical Performance of Eyes Implanted with IOLs to Correct Spherical Aberration" *Invest. Ophthalmol. Vis. Sci.*, 47, 4651-4658 (2006).
77. J. Tabernero, A. Benito, V. Nourrit, and P. Artal, "Instrument for measuring the misalignments of ocular surfaces" *Opt. Express*, 14, 10945-10956 (2006).
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78. P. Artal, A. Benito, J. Tabernero "The human eye is an example of robust optical design" *J. Vis.*, 6, 1–7 (2006).
79. J. Tabernero, P. Piers, P. Artal, "Intraocular lens to correct corneal coma" *Opt. Lett.*, 32, 406-408 (2007).
80. J. Tabernero, S. D. Klyce, E. J. Sarver, P. Artal, "Functional Optical Zone of the Cornea", *Invest. Ophthalmol. Vis. Sci.*, 48, 1053-1060 (2007)
81. Y. Benny, S. Manzanera, P. M. Prieto, E. N. Ribak, P. Artal, "Wide-angle chromatic aberration corrector for the human eye" *J. Opt. Soc. Am. A*, 24, 1538-1544 (2007).
82. P.A. Piers, H.A. Weeber, P. Artal, S. Norrby "Theoretical comparison of aberration-correcting customized and aspheric intraocular lenses" *J. Refract. Surg.*, 23, 374-384 (2007).
83. L. Chen, P. Artal, D. G. Hartnell, D. R. Williams. "Neural compensation for the best aberration correction" *J. Vis.*, 7, 1-9 (2007).
84. J. Tabernero, A. Benito, E. Alcón, P. Artal, "Mechanism of compensation of aberrations in the human eye" *J. Opt. Soc. Am. A*, 24, 3274-3283 (2007).
85. L. Lundström, S. Manzanera, P. M. Prieto, D. B. Ayala, N. Gorceix, J. Gustafsson, P. Unsbo, P. Artal, "Effect of optical correction and remaining aberrations on peripheral resolution acuity in the human eye" *Opt. Exp*, 15, 12654-12661 (2007).
86. E. J. Fernández, P. Artal, "Dynamic eye model for adaptive optics testing" *App. Opt.*, 46, 6971-6977 (2007).
87. P. A. Piers, S. Manzanera, P. Prieto, N. Gorceix, P. E. J. Fernández, P. Artal, "Use of adaptive optics to determine the optimal ocular spherical aberration" *J Cat Ref. Surg.*, 33, 1721–1726 (2007).
88. S. Manzanera, P. M. Prieto, D. B. Ayala, J. M. Lindacher, P. Artal. "Liquid crystal Adaptive Optics Visual Simulator: Application to testing and design of ophthalmic optical elements" *Opt. Express*, 15, 16177-16188 (2007).
89. J. M. Bueno, D. D. Brouwere, H. Ginis, L. Sgouros, P. Artal. "Purkinje imaging system to measure anterior segment scattering in the human eye" *Opt.Lett.*, 32, 3447-3449 (2007).
90. P. Artal, J. Tabernero "The eye's aplanatic answer" *Nature Photonics* 2, 586-589 (2008).
91. S. Manzanera, C. Canovas, P. M. Prieto, P. Artal. "A wavelength tunable wavefront sensor for the human eye" *Opt. Express*. 16, 7748-7755 (2008).
92. E. A. Villegas, E. Alcon, P. Artal. "Optical Quality of the Eye in Subjects with Normal and Excellent Visual Acuity" *Invest. Ophthalmol. Vis. Sci.* 49, 4688-4696 (2008).
93. V. Nourrit, J.M. Bueno, B. Vohnsen, P. Artal. "Nonlinear registration for scanned retinal images: application to ocular polarimetry" *Applied Optics*. 47, 5341-5347 (2008).
94. B. Vohnsen, P. Artal, "Second-harmonic microscopy of ex vivo porcine corneas" *J. of Microscopy-Oxford*. 232, 158–163 (2008).
95. E.J.Fernandez, P. Artal, "Ocular aberrations up to the infrared range: from 632 to 1070 nm" *Optics Express* 16, 21199-21208 (2008).
96. J. Bueno, P. Artal, "Average double-pass ocular diattenuation using foveal fixation" *J. Mod. Opt.*, 55, 849-859 (2008).
97. E. J. Fernández, P. M. Prieto, P. Artal, "Binocular adaptive optics visual simulator", *Opt. Lett.*, 34, 2628 – 2630 (2009).
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98. E. J. Fernández, P. M. Prieto, P. Artal. "Wave-aberration control with a liquid crystal on silicon (LCOS) spatial phase modulator", *Opt. Express*, 17, 11013–11025 (2009).
99. L. Lundstrom, A. Mira-Agudelo, P. Artal, "Peripheral optical errors and their change with accommodation differ between emmetropic and myopic eyes", *J. Vision*, 9(6):17, 1–11 (2009).
100. P. Artal, "History of IOLS that correct spherical aberration", *J. Cataract Refract. Surg.*, 35, 962–963 (2009).
101. A. Mira-Agudelo, L. Lundstrom, P. Artal, "Temporal dynamics of ocular aberrations: monocular vs binocular vision", *Ophthalmic Physiol. Opt.*, 29, 256–263 (2009).
102. P. Prado, J. Arines, S. Bará, S. Manzanera, A. Mira-Agudelo, & P. Artal, Changes of ocular aberrations with gaze *Ophthalmic and Physiological Optics*, 29 (3), 264-271(2009).
103. G. Pérez, S. Manzanera, P. Artal, "Impact of scattering and spherical aberration in contrast sensitivity", *J. Vision*, 9(3):19, 1–10 (2009).
104. A. Benito, M. Redondo, P. Artal, " Laser In Situ Keratomileusis Disrupts the Aberration Compensation Mechanism of the Human Eye ", *Am. J. Ophthalmol.*, 147, 424-431 (2009).
105. J. M. Bueno, B. Vohnsen, L. Roso, P. Artal, "Temporal wavefront stability of an ultrafast high-power laser beam", *Appl. Opt.*, 48, 770-777 (2009).
106. E. J. Fernández, P. M. Prieto, P. Artal, "Wave-aberration control with a liquid crystal on silicon (LCOS) spatial phase modulator", *Opt. Express*, 17, 11013–11025 (2009).
107. P. Artal, J. Tabernero, "Optics of human eye: 400 years of exploration from Galileo's time", *Appl. Opt.*, 49 (26), 123-130 (2010).
108. E. Gualda, J. M. Bueno, P. Artal, "Wavefront optimized nonlinear microscopy of ex vivo human retinas", *J. Biomed. Opt.*, 15, 2, 026007, 1-7 (2010).
109. J. M. Bueno, E. Acosta, C. Schwarz, P. Artal, "Wavefront measurements of phase plates combining a point-diffraction interferometer and a Hartmann–Shack sensors", *Appl. Opt.*, 49, 450-456 (2010).
110. G. M. Pérez, S. M. Archer, P. Artal, "Optical Characterization of Bangerter Foils", *Invest. Ophthalmol. Vis. Sci.*, 51, 609-613 (2010).
111. E. Acosta, J. M. Bueno, C. Schwarz, P. Artal, "Relationship between wave aberrations and histological features in ex-vivo porcine crystalline lenses", *J. Biomed. Opt.*, 15, 055001 (2010).
112. Y. Nishi, N. Hirnschall, A. Crnej, V. Gangwani, J. Tabernero, P. Artal, O. Findl, "Reproducibility of intraocular lens decentration and tilt measurement using a clinical Purkinje meter", *J. Cataract Refract. Surg.*, 36, 1529–1535 (2010).
113. G.M. Pérez, S. Abenza, A. De Casas, J.M. Marín, P. Artal, "Cause of Monocular Diplopia Diagnosed by Combining Double-pass Retinal Image Assessment and Hartmann-Shack Aberrometry", *J. Refract. Surg.*, 26 (4) 301-304 (2010).
114. E. Gualda, J. M. Bueno, P. Artal, "Wavefront optimized nonlinear microscopy of ex vivo human retinas", *J. Biomed. Opt.*, 15, 2, 026007, 1-7 (2010).
115. J. M. Bueno, Eva Acosta, Christina Schwarz, Pablo Artal, "Wavefront measurements of phase plates combining a point-diffraction interferometer and a Hartmann–Shack sensors", *Appl. Opt.*, 49, 450-456 (2010).
116. Cánovas, P. M. Prieto, S. Manzanera, A. Mira, P. Artal, "Hybrid adaptive-optics visual simulator" *Opt. Lett.*, 35, 196-198 (2010).
-

117. P. Artal, S. Manzanera, P. Piers, H. Weeber, "Visual effect of the combined correction of spherical and longitudinal chromatic aberrations", *Opt. Express*, 18, 1637-1648 (2010).
118. E.J. Fernández, P. M. Prieto, P. Artal "Adaptive optics binocular visual simulator to study stereopsis in the presence of aberrations", *J. Opt. Soc. Am. A.*, 7 (11), A48-A55 (2010).
119. E. Berrio, J. Tabernero, P. Artal, "Optical aberrations and alignment of the eye with age ", *J. Vision* 10 (14):34, 1–17 (2010).
120. J. M. Bueno, E. Gualda, P. Artal, "Adaptive optics multiphoton microscopy to study ex vivo ocular tissues", *J. Biomed. Opt.* 5(6), 066004 (2010).
121. P. Artal, A. Benito, GM Pérez, E. Alcón, et al. An Objective Scatter Index Based on Double-Pass Retinal Images of a Point Source to Classify Cataracts. *PLoS ONE* 6(2): e16823 (2011).
122. V. Soler, A. Benito, P. Soler, C. Triozon, J. Arné, V. Madariaga, P. Artal, F. Malecaze "A Randomized Comparison of Pupil-Centered vs Vertex-Centered Ablation in LASIK Correction of Hyperopia", *Am. J. Ophthalmol.*, 152, 591-599 (2011).
123. A. Benito, M. Redondo, P. Artal, "Temporal evolution of ocular aberrations following laser in situ keratomileusis" *Ophthalmic Physiol. Opt.*, 31, 421–428 (2011).
124. A. Benito, G.M. Pérez, S. Mirabet, M. Vilaseca, J. Pujol, J.M. Marín, P. Artal "Objective optical assessment of tear-film quality dynamics in normal and mildly symptomatic dry eyes" , *J. Cataract Refract. Surg.*, 37(8), 1481-7 (2011).
125. J. Tabernero, E. Berrio, P. Artal, "Modeling the mechanism of compensation of aberrations in the human eye for accommodation and aging" *J. Opt. Soc. Am. A*, 28 (9), 1889-1895 (2011).
126. J. Tabernero, C. Schwarz, E. J. Fernández, P. Artal. "Binocular Visual Simulation of a Corneal Inlay to Increase Depth of Focus", *Invest. Ophthalmol. Vis. Sci.*, 52 , 5273-5277 (2011).
127. C. Alja, H. Nino; N. Yutaro; P. Artal et al. "Impact of intraocular lens haptic design and orientation on decentration and tilt", *J. Cataract Refract. Surg.*, 37(10), 1768-1774 (2011).
128. B. Jaeken, L. Lundstrom, P. Artal. "Peripheral aberrations in the human eye for different wavelengths: off-axis chromatic aberration", *J. Opt. Soc. Am. A*, 28 (9), 1871-1879 (2011).
129. J. Bueno, E. Gualda, A. Giakoumaki, P. Artal et al. "Multiphoton Microscopy of Ex Vivo Corneas after Collagen Cross-Linking", or(s): *Invest. Ophthalmol. Vis. Sci.*, 52 , 5325-5331 (2011).
130. J. Bueno, E. Gualda. P. Artal, "Analysis of Corneal Stroma Organization With Wavefront Optimized Nonlinear Microscopy", *Cornea*, 30 (6), 692-701 (2011).
131. B. Jaeken, L. Lundstrom, P. Artal, "Fast scanning peripheral wave-front sensor for the human eye", *Opt. Express*, 19, 7903-7913 (2011).
132. C. Schwarz, P. M. Prieto, E. J. Fernández, P. Artal, "Binocular adaptive optics vision analyzer with full control over the complex pupil functions," *Opt. Lett.* 36, 4779-4781 (2011).
133. J. Tabernero, P. Artal, "Optical modeling of a corneal inlay in real eyes to increase depth of focus: Optimum centration and residual defocus", *J. Cataract Refract Surg.*, 38, 270-277, (2012).
134. B. Jaeken, J. Tabernero, F. Schaeffel, P. Artal, "Comparison of two scanning instruments to measure peripheral refraction in the human eye", *J. Opt. Soc. Am. A*, 29, (3), 258-264, (2012).
135. H. Ginis, G. M. Pérez, J. M. Bueno, P. Artal, "The wide-angle point spread function of the human eye reconstructed by a new optical method", *J. Vis* 12,20 (2012).
-

136. E. A. Villegas, E. Alcón, P. Artal, "Impact of positive coupling of the eye's trefoil and coma in retinal image quality and visual acuity", *J. Opt. Soc. Am. A*, 29, (8), 1667-1672, (2012)
137. Artal P, Schwarz C, Cánovas C, Mira-Agudelo A., "Night Myopia Studied with an Adaptive Optics Visual Analyzer", *PLoS ONE*, 7 (7), 40239, (2012)
138. R. Rosen, B. Jaeken, A. Lindskoog Petterson, P. Artal, P. Unsbo, L. Lundstrom, "Evaluating the peripheral optical effect of multifocal contact lenses" *Ophthalmic Physiol Opt.*, 1-8, (2012)
139. C. Canovas, S. Abenza, E. Alcon, E. A. Villegas, J. M. Marin, P. Artal, "Effect of corneal aberrations on intraocular lens power calculations", *J Cataract Refract Surg*, 38, 1325-1332, (2012)
140. B. Jaeken, P. Artal, "Optical Quality of Emmetropic and Myopic Eyes in the Periphery Measured with High-Angular Resolution", *Invest. Ophthalmol. Vis. Sci.*, 53(7), 3405-3413, (2012)
141. B. Jaeken, J. Tabernero, F. Schaeffel, P. Artal, "Comparison of two scanning instruments to measure peripheral refraction in the human eye", *J. Opt. Soc. Am. A*, 29, (3), 258-264, (2012)
142. E. J. Fernandez, C. Schwarz, P. M. Prieto, S. Manzanera, P. Artal, "Impact on stereo-acuity of two presbyopia correction approaches: monovision and small aperture inlay", *Biom. Opt. Express*, 4, 6, 822-830, (2013)
143. H. S. Ginis, G. M. Perez, J. M. Bueno, A. Pennos, P. Artal, "Wavelength Dependence of the Ocular Straylight", *Invest Ophthalmol Vis Sci.*, 54, 3702-3708, (2013)
144. B. Jaeken, S. Mirabet, J. M. Marín, P. Artal, "Comparison of the Optical Image Quality in the Periphery of Phakic and Pseudophakic Eyes", *Invest Ophthalmol Vis Sci*, 54, 3594-3599, (2013)
145. C. Schwarz, S. Manzanera, P. Artal "Binocular visual performance with aberration correction as a function of light level", *Journal of Vision*, 14, 1-11, (2014)
146. B. Leray, M. Cassagne, V. Soler, E. Villegas, C. Triozon, G. Perez, J. Letsch, E. Chapotot, P. Artal, F. Malecaze, "Relationship between Induced Spherical Aberration and Depth of Focus after Hyperopic LASIK in Presbyopic Patients" *Ophthalmology - American Academy of Ophthalmology*, 2014-362., 1-11, (2014)
147. P. Artal, "Optics of the eye and its impact in vision: a tutorial". *Advances in Optics and Photonics*, 6, 340-367, (2014)
148. H. Ginis, O. Sahin, A. Pennos and P. Artal "Compact optical integration instrument to measure intraocular straylight", *Biomedical Optics Express*, Vol. 5, pp. 3036-3041, (2014)
149. E. Chirre, P. Prieto and P. Artal, "Binocular open-view instrument to measure aberrations and pupillary dynamics" *Optics Letters*, Vol. 39, pp. 4773-4775, (2014)
150. C. Schwarz, S. Manzanera, P. Prieto, E. Fernández, and P. Artal, "Comparison of binocular through-focus visual acuity with monovision and a small aperture inlay" *Biomedical Optics Express*, Vol. 5, pp. 3355-3366, (2014)
151. E. Villegas, E. Alcon, E. Rubio, J. Marín, P. Artal, "Refractive accuracy with light-adjustable intraocular lenses" *J Cataract Refract Surg*, 40, 12, (2014)
152. J. Tabernero, P. Artal, "Lens Oscillations in the Human Eye. Implications for Post-Saccadic Suppression of Vision" *PLoS ONE*, 9(4), (2014)
153. J. M. Bueno, R. Palacios, A. Giakoumaki, E. J. Gualda, F. Schaeffel, P. Artal. "Adaptive Optics Multiphoton Microscopy: Probing the Eye More Deeply", *Biom. Opt. Express*, 5, 3, 664-674, (2014)
-

154. E. A. Villegas, E. Alcón, S. Mirabet, I. Yago, J. M. Marín, P. Artal. "Extended Depth of Focus With Induced Spherical Aberration in Light-Adjustable Intraocular Lenses", *Am. J. Ophthalmol.*, 157 (1), 142-149, (2014)
155. J. M. Bueno, M. Skorsetz, R. Palacios, E. J. Gualda, P. Artal. "Multiphoton imaging microscopy at deeper layers with adaptive optics control of spherical aberration". *J. Biomed. Opt.*, 19(1), 0110071- 0110077, (2014)
156. C. Schwarz, C. Canovas, S. Manzanera, H. Weeber, P. M. Prieto, P. Piers, P. Artal "Binocular visual acuity for the correction of spherical aberration in polychromatic and monochromatic light". , *J. Of Vision*, 14(2):8, 1-11, (2014)
-