

CURRICULUM VITAE Dr. JOHN FREDY BARRERA RAMIREZ



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Short Biography

John Fredy Barrera Ramírez received his BSc, MSc, and PhD degrees in physics from Antioquia University (Medellín, Colombia) in 2001, 2003, and 2007, respectively. His Doctoral Thesis received the academic distinction of “*Summa Cum Laude*”. Since 2006 he has been with Antioquia University, where he is Professor in the Physics Institute and coordinator of the Optics and Photonic’s Group. He received the international award “*ICO/ICTP GALLIENO DENARDO AWARD*” given by the International Commission for Optics (ICO) and the International Centre for Theoretical Physics (ICTP) (Trieste-Italia 2014), he has been selected as “Future Leader 2016” in the Science and Technology in Society (STS) Forum, “*Young TWAS Affiliate*” of the World Academy of Sciences (TWAS), “*Junior Associate*” (2012-2017) and “*Regular Associate*” (2018-2023) of the International Centre for Theoretical Physics (ICTP), “*one out of 30 scientists under 40 years old that are doing promising research*” according the scientific platform “*Latinamerica Science*” and he was invited researcher in the frame of the program “*Research Stays for Renowned Researchers*”, Universidad Politécnica de Valencia (Valencia, Spain, 2011-2012). John Fredy was designated “*OSA Senior Member*” of the Optical Society (OSA) and member of the Editorial Board of the Heliyon’s Elsevier Journal in 2015, also he is member of the International Society for Optics and Photonics (SPIE) and the TWAS Young Affiliates Network (TYAN).

He received the “*National Award to the Scientific Merit*” in the category “*Excellence in Research*” given by the “Colombian Association for the Advance of Science” (Colombia-2015), twice the Honorary Mention in the “*National Awards of Science*” awarded by the Alejandro

Ángel Escobar Foundation (in 2014 and 2017), and *twice* the regional award “*Greatest impact research award*” given by the Municipality of Medellín (in 2013 and 2017). Besides, he was awarded with the distinction “*Francisco José de Caldas Medal to the University Excellence*” from Universidad de Antioquia (Medellín, Colombia, 2015), and the “*Universidad de Antioquia Research Award*” (Second category, Universidad de Antioquia, Medellín, Colombia, 2014).

Some contributions by John Fredy Barrera Ramírez and his collaborators have been selected to be included and highlighted in exclusive sections of journals and prestigious scientific platforms such as the “*Research Highlights*” section of Nature Photonics (May 2003), *twice* the exclusive section “*IOPselect*” of IOP Science, the special section “*Spotlight on Optics*” of Optical Society (OSA) (March 2011), *twice* in the collection “*Highlights of 2013*” and *three times* in the section “*LabTalk*” of Journal of Optics, in the Top Downloaded Articles in Image Processing from the OSA Journals over the past two years (February 2014), the “*TWAS Annual Report 2012*”, in the TWAS web site with the article “*The creative power of collaboration*”, and in “*Roadmap on optical security*” of Journal of Optics (2016). During the last four years, some scientific contributions of John Fredy Barrera Ramírez and his collaborators in the area of Optical Encryption have been listed in 25 occasions in the “*Top Downloaded Articles*” from OSA Journals. John Fredy is reviewer of several international journals: Optics Express, Optics Letters, IEEE Photonic Journal, Journal of Lightwave Technology, Journal of Optics, Journal of the Optical Society of America A, Applied Optics, Journal of Modern Optics, Optics Communications, Optics & Laser technology, Optics and Lasers in Engineering, Photonics Research, Optical Engineering, Cryptologia, Optical and Quantum Electronics, Advances in OptoElectronics, The Scientific World Journal, International Journal of Electronics and Communications, and Chinese Optics Letters; member of the Colombian Association for the Advance of Science, and the Colombian optical network. He has authored 54 peer-reviewed international papers, one invention patent, 19 publications in international conference proceedings and 18 publications in national peer-reviewed journals with more than one thousand citations. John Fredy has participated with 34 contributions in international conferences and 52 in national meetings. John Fredy Barrera Ramírez has been lecturer in international events and national conferences. He has participated as leader in 10 research projects and in 10 projects as member of the research team. He also has been jury of some national scientific awards, reviewer of some national scientific journals, and jury of thesis and research proposals for several undergraduate and graduate programs in Colombia and Member of International Academic Committees in national meetings. He has been professor of the undergraduate and graduate programs in the Institute of Physics of the Universidad de Antioquia (Medellín, Colombia). He has been director of the undergraduate and graduate students where some of them have obtained Awards, scholarships and positions. He has performed some activities focused to scientific general divulgation as interviews in scientific platforms and radio programs, writing articles on his work in national and international journals, magazines and newspapers, and also conferences for a general auditory. His research interests include optical information processing, optical encryption and validation, optical data compression, diffractive optics, holography, interferometry, and optical vision.

Present position

- ◆ Full Time Professor, Category: Associate Professor, Instituto de Física, Universidad de Antioquia, Medellín, Colombia.

Academic degrees

- ◆ PhD in Physics, Universidad de Antioquia, Medellín, Colombia, 2007. Subject of Thesis: “*Optical Encryption: Study and Development of Alternative Architectures*”. Recipient of the *Summa Cum Laude* award.
- ◆ Msc in Physics, Universidad de Antioquia, Medellín, Colombia, 2003.
- ◆ Bsc in Physics, Universidad de Antioquia, Medellín, Colombia, 2001.

Other academics degrees

Diploma in Color Theory, Universidad de Antioquia, Medellín, Colombia, 2002.

Diploma in Pedagogical Foundations and University Teaching, Universidad de Antioquia, Medellín, Colombia, 2007.

Training Courses

Integration of the Information and Communication Technologies in Teaching, Universidad de Antioquia, Medellín, Colombia, 2007.

Areas of interest

Physics-Optics: optical information processing, optical encryption and validation, optical compression, diffractive optics, holography, interferometry, and optical vision.

Professional experience

- ◆ Full Professor, Category: Associate Professor, Physics Institute, Faculty of Natural Sciences, **Universidad de Antioquia**, Medellín, Colombia (from 22/06/2006 to present).
- ◆ Coordinator of Optics and Photonic's Group, Physics Institute, Universidad de Antioquia, Medellín, Colombia. (from 01/02/2011 to present)
- ◆ Teaching assistant, Department of Basic Sciences, **EAFIT University**, Medellín, Colombia (from 01/07/2003 to 30/12/2003).
- ◆ Teaching assistant, Physics Institute, Faculty of Natural Sciences, **Universidad de Antioquia**, Medellín, Colombia (from 01/02/2001 to 30/12/2003).

Scientific Administration

Coordinator of the research group: *Optics and Photonic's Group* (February 2011 to present), Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia.

Web page: <http://grupodeopticayfotonicaudea.weebly.com/>

International Awards, Honors, Associateships and Acknowledgments

- Recipient of the “*ICO/ICTP Gallieno Denardo Award*” given by the International Commission for Optics ICO and the International Centre for Theoretical Physics ICTP, ICTP, Trieste, Italy, February 18, 2014.
- Designated “*Future Leader 2016*” in the Science and Technology in Society (STS) Forum Kyoto, Japan, October 2016.
- Designated “*Young TWAS Affiliate*” of The World Academy of Sciences (TWAS) until 2018, Sultanate of Oman, October 2014.
- Designated “*ICTP Regular Associate*” of the International Centre for Theoretical Physics (ICTP) (2108-2023).
- Designated “*ICTP Junior Associate*” of the International Centre for Theoretical Physics (ICTP) (2012-2017).
- Selected by the scientific platform Latinamerica Science as “*one out of 30 scientists under 40 years old that are doing promising research*” (May, 2014).
- Designated “*OSA Senior Member*” of the Optical Society (OSA), may 2015.
- Designated “*Member of the Editorial Board*” of the Heliyon’s Elsevier Journal (May 2015).
- Recipient of the “*TWAS-UNESCO Associateship*” appointments Refs: 3240178896 and 3240246396 from 2009 to 2012.
- Invited Researcher in the frame of the program “**Research Stays for Renowned Researchers**” from Universidad Politécnica de Valencia (Valencia, Spain, 2011-2012).

National Awards, Honors, Associateships and Acknowledgments

- Recipient of the “*Greatest impact research during 2016-2017 award*” given by the Municipality of Medellín, Medellín, Colombia, December 6, 2018.
- Recipient of an “*Honorary mention*” in the “**National Awards of Science**” awarded by the Alejandro Ángel Escobar Foundation, Bogota, Colombia, October 4, 2018.
- Recipient of the “*National Award to the Scientific Merit*” in the category “**Excellence in Research**”, Colombian Association for the Advance of Sciences, Bogotá, Colombia, September 30, 2015.
- Recipient of an “*Honorary mention*” in the “**National Awards of Science**” awarded by the Alejandro Ángel Escobar Foundation, Bogota, Colombia, October 8, 2014.
- Recipient of the “*Greatest impact research during 2012-2013 award*” given by the Municipality of Medellín, Medellín, Colombia, December 6, 2013.
- Recipient of the “*Francisco José de Caldas Medal to the University Excellence*”, Antioquia University, Medellín Colombia, October 9, 2015.
- Recipient of the “*Universidad de Antioquia Research Award*”, Second Category, Universidad de Antioquia, Medellín, Colombia, October 9, 2014.
- “*Distinction*” given by the Faculty of Natural Sciences of Universidad de Antioquia for have been selected as “Future Leader 2016” in the Science and Technology in Society (STS) Forum Kyoto-Japan 2016 (Universidad de Antioquia, Medellín, Colombia, 2016).
- “*Distinction*” given by the Faculty of Natural Sciences of Universidad de Antioquia for “*the National Award to the Scientific Merit*” in the category “*Excellence in Research*” and the “*Francisco José de Caldas Medal to the University Excellence*” received in 2015 (Universidad de Antioquia, Medellín, Colombia, 2015).

- “**Distinction**” given by the Faculty of Natural Sciences of Universidad de Antioquia for “*the national and international acknowledgments and awards received during 2014*” (Universidad de Antioquia, Medellín, Colombia, 2014).
- “**Acknowledgment**” given by the Faculty of Natural Sciences of Universidad de Antioquia for the “**2014 ICO/ICTP Gallieno Denardo Award**” received in 2014 (Universidad de Antioquia, Medellín, Colombia, 2014).
- Recipient of a “**Summa Cum Laude**” distinction by PhD in Physics, Universidad de Antioquia, Medellín, Colombia (2007).

Patent

Invention Patent: “Opto-physical apparatus and procedures for encrypting information and its recovering free of noise”. National patent: CIP classification: G06F – G06K. J.F. Barrera R., A. Mira, R. Torroba (December 18, 2015).

Highlighted contributions

1. The contribution the “*Optical field data compression by opto-digital means*”, *Journal of Optics* 18, 125701 (2016)” was included in the exclusive sections “**IOPselect**” of *IOPscience* and in the collection “**Highlights of 2013**” of *Journal of Optics*.
2. The paper “*Optical encryption and QR codes: Secure and noise-free information retrieval*”, *Optics Express* 21, 5373-5378 (2013)” was covered in the “**Research Highlights**” section of *Nature Photonics* Vol. 7 343 (April 2013). Also and has appeared in the Top Downloaded Articles in Image Processing from the “Optical Society” OSA Journals over the past two years (February 2014).
3. The contribution the “*Experimental multiplexing protocol to encrypt messages of any length*, *Journal of Optics* 15, 055404 (2013)” was included in the exclusive section “**IOPselect**” of *IOPscience* and in the collection “**Highlights of 2013**” of *Journal of Optics*.
4. The article “*All-optical encrypted movie*, *Optics Express* 19, 5706-5712 (2011)” was nominated and selected by OSA among its six major technical divisions to be showcased in the section “**Spotlight on Optics**”.
5. The contribution “*Subsampling technique to enhance the decoded output of JTC encrypting system*, Proc. of SPIE Vol. 8011, 80117C (2011)” was selected as “**Keynote paper**” in the XXII Congress of the International Commission for Optics: Light for the Development of the World.

Works awarded in conferences and meetings

- Recipient of the “**Best presentation work**” award in the RIAO/OPTILAS 2016 – IX Iberoamerican Meeting on Optics and XII Latin American Meeting on Optics, Lasers and Lasers and their Applications (Pucón, Chile) 2016. Presentation: “*Axial Multiplexing of encrypted data in the Fresnel domain*”, A. Veléz, A. Jaramillo, J.F. Barrera R., R. Torroba. Presented by A. Veléz.
- Recipient of the “**Best presentation work**” award in the Students of Optics and Photonics Meeting and XXIII workshop in Optics and Photonics (Buenos Aires, Argentina) 2016. Presentation: “*Optical encryption by free space propagation*”, A. Veléz, J.F. Barrera R., A. Jaramillo, R. Torroba. Presented by A. Veléz.

- Recipient of the “**Best presentation work** (Second place)” award in the International Conference On Speckle Metrology (Guanajuato, Mexico) 2015. Presentation: “*Secure optodigital protocol to handle messages using the multiplexing of processed QR codes*”, S. Trejos, J.F. Barrera R., R. Torroba. Presented by S. Trejos.
- Recipient of the “**Best presentation work** (Third place)” award in XIV National Meeting on Optics and V Andean and Caribbean Conference on Optics and Applications (Cali, Colombia) 2015. Presentation: “*Volume reduction of holographic data*”, S. Trejos, J.F. Barrera R., A. Velez, M. Tebaldi, R. Torroba. Presented by S. Trejos.
- Recipient of the “**Best Master presentation work** (Third place)” award in X National Meeting on Optics, Cali (Colombia) 2006. Presentation: “Number of Fresnel zones and diffracted light by a slit” by Edgar A. Rueda, Francisco F. Medina. Presented by E. Rueda.
- Recipient of the “**Best Bachelor presentation work** (Third place)” award in X National Meeting on Optics, Cali (Colombia) 2006. Presentation: “Self-imaging model in the Talbot effect” by Catalina M. Macías, John F. Barrera R., Fernando F. Medina, Edgar A. Rueda. Presented by C. Macias.

Writing articles on our work

In English

1. “**Optical cryptography: Data safeguarding with the power of light**”, section LabTalk, Journal of Optics, November (2015).
<http://iopscience.iop.org/2040-8986/labtalk-article/63208>
2. “**Efficient and secure handling of multiple data using an optodigital processor**”, section Labtalk, Journal of Optics, July (2014).
<http://iopscience.iop.org/2040-8986/labtalk-article/57967>
3. “**Information security through light: Protecting information with optical processors**”, section Labtalk, Journal of Optics, August (2013).
<http://iopscience.iop.org/2040-8986/labtalk-article/54457>
4. “**The Creative Power of Collaboration**”, TWAS web page (2013).
<http://twas.org/article/creative-power-collaboration>
This news was part of a story included in the “*TWAS ANNUAL REPORT 2012*”, 44-45 (2013). <http://twas.org/publications/annual-reports>

In Spanish:

- “Hiding information”, El Colombiano Newspaper, September (2014).
http://www.elcolombiano.com/asi_se_oculta_una_informacion-EFEC_311522
- “Encrypting information”, Revista Experimenta, Universidad de Antiquia, January (2015).
<http://aprendeenlinea.udea.edu.co/revistas/index.php/experimenta/article/view/24570>

Invited Talks and Lectures

1. “**Data protection using optical encryption**”, invited lecture at “*The first international conference of the TWAS Young Affiliate Network (TYAN)*”, Rio de Janeiro, Brazil, August 24, 2017.

2. ***“Data protection using optical encryption and QR codes”***, invited lecture at *“The World Academy of Sciences TWAS 25th General Meeting”*, Muscat, Sultanate of Oman, October 28, 2014.
3. ***“Optical instruments and innovative technologies”***, invited plenary lecture at the *“Pedro Nel Gómez Lectures”*, Medellín, Colombia, October 6, 2014.
4. ***“Novel approaches and applications in optical encryption”***, invited plenary lecture at the *“2nd International Conference on Applications of Optics and Photonics”*, Aveiro, Portugal, May 29, 2014.
5. ***“Information security using a joint transform correlator encrypting architecture”***, invited talk at the *“23rd Congress of the International Commission for Optics”*, Santiago de Compostela, Spain, August 29, 2014.
6. ***“Protecting information using optical processors”***, invited lecture at the *“III International Seminar of Applied Sciences and XI meeting on industrial Microbiology”*, Bucaramanga, Colombia, May 15, de 2014.
7. ***“Optical Encryption”***, invited Lecture in the frame of ***“2014 ICO/ICTP Gallieno Denardo Award”*** ceremony and the *“Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications”*, International Centre for Theoretical Physics (ICTP), Trieste Italy, February 18, 2014.
8. ***“Information encryption using optical processing”***, invited talk at the Conference *“XIII National meeting on Optics (XIII ENO) and IV Andina and from Caribe Conference on Optics and its applications (IV CANCOA)”*, Medellín, Colombia, November 14, 2013.
9. ***“Optical encryption for multiple data”***, invited talk at the Meeting *“Optical Fibers and Signal Processing”*, Valencia, Spain, July 5, 2012.

Other invited lectures

- ***“Encrypting information using optical systems”***, invited lecture at Universidad Nacional de Colombia in the *“Physics Department Colloquium”*, Bogotá, Colombia, April 2015.
- ***“Protecting information using optical Processors”***, invited lecture at Universidad EAFIT in *“XIV lectures on Physics Engineering”*, Medellín, Colombia, April 2015.
- ***“Optical encryption of information: a challenge underway”***, invited lecture at *“Seminario de Investigación”*, Programa de Maestría y Doctorado en Ciencias – Física, Escuela de Física, Universidad Nacional de Colombia, Medellín, Colombia, May 2017.

Scientific general divulgation activity

1. ***“Optical information processing”***, Interview in the radio program *“Panorama of Science”*, UNradio, Colombia, November, 2015. The interview appears in: <http://unradio.unal.edu.co/nc/detalle/cat/panorama-de-la-ciencia/article/procesamiento-optico-de-informacion.html>
2. ***“Colombian Scientist develops project to protect digital information”***, Interview with CTMASI Communications, Colombia, November, 2015. <http://www.ctmasi.com/index.php/videos/546-cientifico-colombiano-desarrolla-proyecto-para-protoger-la-informacion-digital>

The interview appears in Youtube:

- <https://www.youtube.com/watch?v=UMFFTfnyw-4>
- <https://www.youtube.com/watch?v=MNMI3bWJNmE>
- https://www.youtube.com/watch?v=VIxsm5vI_dQ

3. **“The sofa with scientists”**, Conscience and Solidarity, Alejandro Ángel Escobar Foundation, Universidad EAFIT, Medellín, Colombia, October 8, 2015. <http://www.faae.org.co/PDF/Encuentro-volante.html>
4. **“Encrypting information: is your information protected?”**, Science on Thursdays, Biblioteca Pública Piloto, Medellín., Colombia, April 12, 2012.

Fellowships

- ◆ Fellowship of the The Abdus Salam International Centre for Theoretical Physics (ICTP-Italy) for training in “Winter College on Optics in Imaging Science”, ICTP, Trieste, Italy (from 31/01/2011 to 11/02/2011).
- ◆ Fellowship of the The Abdus Salam International Centre for Theoretical Physics (ICTP-Italy) for training in the “Preparatory School of the Winter College on Micro and Nano Photonics for Life Sciences” and “Winter College on Micro and Nano Photonics for Life Sciences”, ICTP, Trieste, Italy (from 04/02/2008 to 22/04/2008).
- ◆ Fellowship of COLCIENCIAS (Colombia) for graduate (Doctorate) studies in the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 01/07/2003 to 15/12/2006).
- ◆ Fellowship of the Multipurpose Optical Network, Abdus Salam International Centre for Theoretical Physics (Italy)-Centro de Investigaciones Ópticas (CIOp) (Argentina) for training and research in the Centro de Investigaciones Ópticas, La Plata, Argentina (from 26/08/2006 to 26/10/2006).
- ◆ Fellowship of COLCIENCIAS (Colombia) for training and research in the Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 01/04/2005 to 30/09/2005).
- ◆ Fellowship of the Multipurpose Optical Network, Abdus Salam International Centre for Theoretical Physics (Italy)-Centro de Investigaciones Ópticas (CIOp) (Argentina) for training and research in the Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 12/10/2004 to 11/12/2004).
- ◆ Fellowship of the The Abdus Salam International Centre for Theoretical Physics (ICTP-Italy) for training in the “Second Workshop on Distributed Laboratory Instrumentation Systems”, ICTP, Trieste, Italy (from 20/10/2003 to 14/11/2003).
- ◆ Fellowship of the Universidad de Antioquia (Colombia) for graduate (Master and Doctorate) studies in the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 01/02/2001 to 30/11/2003).
- ◆ Fellowship of Physics Institute (Colombia) for the Diploma in Color theory in the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 30/08/2001 to 30/03/2002).
- ◆ Fellowship of the Colombian Industrial Bank (Colombia) for undergraduate (Bachelor) studies in the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 01/07/1995 to 01/02/2001).
- ◆ Special distinction for undergraduate (Bachelor) studies in the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 01/02/2000 to 30/11/2000).
- ◆ Special distinction as assistant in the Computer Lab of the Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 01/02/2000 to 30/11/2000).

Research stays

1. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (07/11/2017 to 06/12/2017).
2. International Centre for Theoretical Physics ICTP”, Trieste, Italia (28/01/2017 al 11/02/2017).
3. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (01/11/2016 to 18/11/2016).
4. International Centre for Theoretical Physics ICTP”, Trieste, Italia (28/04/2016 al 28/6/2016).
5. International Centre for Theoretical Physics (ICTP), Trieste, Italy (from 04/05/2015 to 10/07/2015).
6. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 19/10/2015 to 27/11/2015).
7. International Centre for Theoretical Physics (ICTP), Trieste, Italy (from 26/01/2014 to 05/04/2014).
8. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 07/10/2013 to 09/11/2013).
9. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 22/09/2012 to 12/12/2012).
10. Departamento de Óptica, Universidad de Valencia, and Centro de tecnologías Físicas, Universidad Politécnica de Valencia; Valencia, Spain (from 02/07/2012 to 13/07/2012).
11. Centro de tecnologías Físicas, Universidad Politécnica de Valencia, Valencia, Spain (from 17/12/2011 to 18/02/2012). Research fellowship in the program: “*Research stays for Renowned researchers*”, Universidad Politécnica de Valencia (2011).
12. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 13/09/2011 to 09/12/2011).
13. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 18/09/2010 to 15/12/2010).
14. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 10/04/2010 to 09/05/2010).
15. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 23/03/2009 to 21/06/2009).
16. Centro de Investigaciones Ópticas (CIOp), La Plata, Argentina (from 01/09/2008 to 17/10/2008).

International training

1. “*Winter College on Optics: Advanced Optical Techniques for Bio-imaging*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (13/02/2017 to 24/02/2017).
2. “*Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (10/02/2014 to 21/02/2014).
3. “*Preparatory School to the Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (03/02/2014 to 07/02/2014).

4. “*Winter College on Optics in Imaging Science*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (31/01/2011 to 11/02/2011).
5. “*Preparatory School of the Winter College on Micro and Nano Photonics for Life Sciences*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (04/02/2008 to 08/02/2011).
6. “*Winter College on Micro and Nano Photonics for Life Sciences*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (11/02/2008 to 22/02/2018).
7. “*Second Workshop on Distributed Laboratory Instrumentation Systems*”, International Centre for Theoretical Physics (ICTP), Trieste, Italy (20/10/2003 to 14/11/2003).

Research Grants

Leader of the projects:

1. “New representation of optical cryptography”, granted by CODI, Universidad de Antioquia, Medellín, Colombia, Current.
2. “Support to Research Groups 2014-2015” granted by CODI, Universidad de Antioquia, Medellín, Colombia, Current.
3. “Protecting information using optical processors” granted by CODI, Universidad de Antioquia, Medellín, Colombia, Current.
4. “Opto-digital techniques of multiple encryption with potential applications in massive use” granted by COLCIENCIAS, Colombia (2013-2015).
5. “Optical encryption systems: optimization of the retrieved information” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2013-2015).
6. “Support to Research Groups 2012-2013” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2012-2014).
7. “Managing Multiple Data using Optical Information Processing” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2011-2013).
8. “Wavefront Compensation in Optical Information Processing” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2010-2013).
9. “Evaluation and increase of the security in the Optical encryption systems” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2008-2011).
10. “Optical system used in security applications” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2007-2008).

Member of the team in the following projects:

1. “Lenses performance of extended depth of focus without axial symmetry for presbyopia compensation” granted by COLCIENCIAS, Colombia, Current.
2. “Relationship between the chromatic aberration and the focusing dynamic system of the human eye” granted by CODI, Universidad de Antioquia, Medellín, Colombia, (2013-2015).
3. “Optical vortices generation by means of transmission-type spatial light modulators” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2010-2012).

4. “Wavefront Modulation in Optical Information Processing” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2007-211).
5. “Opto-digital Processing by mean of Random Carriers” granted by Agencia Nacional de Promoción Científica y Tecnológica, Argentina (2008-2011).
6. “Optical techniques in encrypting systems” granted by COLCIENCIAS, Colombia (2009-2010).
7. “Optical Encoding Techniques” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2006-2007).
8. “Diffractive Optical Elements” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2002-2005).
9. “Support to Research Groups 2003-2004” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2003-2005).
10. “Optical Properties of the Kinoform Sampling Filter” granted by CODI, Universidad de Antioquia, Medellín, Colombia (2001-2002).

Direction of Thesis and Final Works

- Direction of Doctoral thesis “Processing of multiple data and information compression using analog-digital optical techniques” of Msc. Sorayda Trejos from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2017. Recipient of the academic distinction of “Summa Cum Laude”.
- Telecommunications Engineering, Mauricio Herrera, Final Work as Young Research of Colciencias: “Image processing for removing speckle noise generated during optical encryption”, 2016.
- Telecommunications Engineering, Santiago Abelardo Montoya Castro, Final Work as Young Research of Colciencias: “Speed limits and distance in the transmission of information by a low-cost optical link with noise-free recovery”, 2015.
- Direction of Bachelor Final Work “Alternative optical architectures for protection and processing of information” of Bsc. John Alexis Jaramillo from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2015.
- Direction of Bachelor Final Work “Processing of multiple data using digital holography” of Bsc. Alejandro Vélez from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2014. Recipient of the “*Special Mention*” Bachelor Final Work Award.
- Direction of Master thesis “Opto-digital packaging of information” of Bsc. Sorayda Trejos from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2013. Recipient of the “*Meritorious mention*” Award.
- Direction of Master thesis “Study of the Security in the Optical Encrypting Systems” of Bsc. Carlos Vargas from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2011. Recipient of the “*Outstanding Mention*” Award.
- Direction of Bachelor Final Work “Optical information processing for multiplexing encrypted data and coding with optical angular momentum” of Bsc. Carlos Ríos from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2010. Recipient of the “*Special Mention*” Bachelor Final Work Award.
- Direction of Bachelor Final Work “Study of the Security in the Optical Encrypting Systems” of Bsc. Juan Serna from Physics Institute, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, 2008.

Services to the community

- Member of the Editorial Board of the Heliyon's Elsevier Journal.
- Reviewer for the journals: Optics Express, Optics Letters, IEEE Photonic Journal, Journal of Lightwave Technology, Journal of Optics, Journal of the Optical Society of America A, Applied Optics, Journal of Modern Optics, Optics Communications, Optics & Laser technology, Optics and Lasers in Engineering, Photonics Research, Optical Engineering, Cryptologia, Optical and Quantum Electronics, Advances in OptoElectronics, The Scientific World Journal, International Journal of Electronics and Communications, and Chinese Optics Letters.
- Member of the External Committee of VII International Congress in Electrical Engineering and Systems, Zacatenco, Mexico (2016).
- Chair of the "Optical imaging II" session in XXIII Congress of the International Commission for Optics ICO XXIII (Santiago de Compostela, Spain) 2014.
- Jury of thesis and research proposals for several undergraduate and graduate programs.
- Reviewer of some national scientific journals in Colombia: Journal of the Engineering Faculty (Universidad de Antioquia), Journal of the Colombian Society of Physics, and Journal of Sciences (Universidad del Valle).
- Member of the Academic Committee of XIII National Meeting on Optics (XIII ENO) and IV CANCOA in Medellín, Colombia (2013).
- Member of the International Academic Committee of XII National Meeting on Optics (XII ENO) and III CANCOA in Pamplona, Colombia (2011).
- Member of the International Academic Committee of XI National Meeting on Optics (XI ENO) and II CANCOA in Pamplona, Colombia (2008).

Participation in curriculum transformation committees and evaluation committees

- Coordinator of the Evaluation Committee, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, (from 2014).
- Member of the Evaluation Committee, Faculty of Natural Sciences, Universidad de Antioquia, Medellín, Colombia, (2013).
- Member of the curriculum transformation committee for the experimental courses, Physics Institute, Universidad de Antioquia, Medellín, Colombia (from 2011 to 2013).
- Member of the curriculum transformation committee for the course "Physics of Waves", Faculty of Engineering, Universidad de Antioquia, Medellín, Colombia (from 2008 to 2009).

Memberships in scientific societies and associations:

- "**Regular Associate**" of the International Centre for Theoretical Physics (ICTP) (from 2018).
- "**Junior Associate**" of the International Centre for Theoretical Physics (ICTP) (2012-2017).
- "**Young TWAS Affiliate**" of the World Academy of Sciences (TWAS) (from 2014).
- "**OSA Senior Member**" of the Optical Society (OSA) (from 2015).
- Member of the TWAS Young Affiliates Network (TYAN) (from 2016).
- Member of the International Society for Optics and Photonics (SPIE).

Member of the Colombian Association for the Advance of Science.
Member of the Colombian Optical Network.

Citations

H-Index: 18 **Source:** Google scholar

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Scientific Publications

a) Publications in international peer-reviewed journals and conference proceedings

Publications in international peer-reviewed journals (54)

1. “Optimized random phase only holograms”, A. Vélez, **J.F. Barrera R.**, Opt. Lett. **43**, 731-734 (2018).
2. “Fractional optical cryptographic protocol for data containers in a noise-free multiuser environment”, A. Jaramillo, **J.F. Barrera R.**, A. Vélez, R. Torroba, Opt. Laser Eng. **102**, 119-125 (2018).
3. “Cross-talk free selective reconstruction of individual objects from multiplexed optical field data”, **J.F. Barrera R.**, A. Jaramillo, A. Vélez, R. Torroba, Opt. Laser Eng. **100**, 90-97 (2018).
4. “Cryptographic salting for security enhancement of double random phase encryption schemes”, A. Vélez, J.F. Barrera R., R. Torroba, J. Opt. **19**, 105703 (2017).
5. “Experimental optical encryption of grayscale information”, A. Vélez, J.F. Barrera R., R. Torroba, Appl. Opt. **56**, 5883-5889 (2017).
6. “Innovative speckle noise reduction procedure in optical encryption”, A. Vélez, J.F. Barrera R., R. Torroba, J. Opt. **19**, 055704 (2017).
7. “Imaging with an extended depth of field by means of the peacock eye optical element”, W. Torres, J.F. Barrera, R. Henao, Z. Jaroszewicz, K. Kakarenko, A. Mira-Agudelo, K. Petelczyc, M. Sypek, A. Kolodziejczyk, Photon. Lett. Poland **9**, 128-130 (2017).
8. “Compensation of Presbyopia With the Light Sword Lens”, A. Mira-Agudelo, W. Torres-Sepúlveda, J.F. Barrera, R. Henao, N. Blocki, K. Petelczyc, A. Kolodziejczyk, Invest Ophthalmol Vis Sci. **57**, 6870-6877 (2016).
9. “Customized data container for improved performance in optical cryptosystems”, A. Vélez, J.F. Barrera R., R. Torroba, J. Opt. **18**, 125702 (2016).
10. “Optical field data compression by opto-digital means”, A. Vélez, J.F. Barrera R., S. Trejos, M. Tebaldi, R. Torroba, J. Opt. **18**, 125701 (2016).
11. “Roadmap in optical security”, B. Javidi, A. Carnicier, W. Chen, X. Chen, E. Pérez-Cabré, M.S. Millán, M. Naruse, T. Matsumoto, C. Guo, J.T. Sheridan, A. Carnicer, I. Juvells, G. Situ, N.K. Nishchal, W. He, X. Peng, A. Stern, Y. Rivenson, P.W.H. Pinkse, A.P. Mosk, M. Yamaguchi, T. Nomura, R. Torroba, **J. Barrera**, A. Alfalou, C. Brosseau, A. Markman, E. Tajahuerce, J. Lancis, J. Opt. **18**, 083001 (2016).

12. "Optical approach for the efficient data volume handling in experimentally encrypted data", S. Trejos, J.F. Barrera R., A. Vélez, M. Tebaldi, R. Torroba, *J. Opt.* **18**, 065702 (2016).
13. "Experimental analysis of a Joint Free Space Cryptosystem", **J.F. Barrera R.**, A. Jaramillo, A. Vélez, R. Torroba, *Opt. Laser Eng.* **83**, 126-130 (2016).
14. "Three-dimensional joint transform correlator cryptosystem", A. Vélez, **J.F. Barrera R.**, R. Torroba, *Opt. Lett.* **41**, 599-602 (2016).
15. "One-step reconstruction of digitally assembled 3D extended holographic scenes" A. Vélez, **J.F. Barrera R.**, R. Torroba, *Opt. & Laser Technol.* **75**, 146-150 (2015).
16. "Optimized and secure technique for multiplexing QR code images of single characters: Application to noiseless messages retrieval", S. Trejos, **J.F. Barrera R.**, R. Torroba, *J. Opt.* **17**, 085702 (2015).
17. "Experimental scrambling and noise reduction applied to the optical encryption of QR codes", **J.F. Barrera R.**, A. Vélez, R. Torroba, *Opt. Express.* **22**, 20268-20277 (2014).
18. "Experimental QR code optical encryption: noise-free data recovering", **J.F. Barrera R.**, A. Mira, R. Torroba, *Opt. Lett.* **39**, 3074-3077 (2014).
19. "Experimental optodigital processing of multiple data via modulation, packaging and encryption", S. Trejos, **J.F. Barrera R.**, M. Tebaldi, R. Torroba, *Journal of Optics* **16**, 055402 (2014).
20. "Experimental double random phase encoding technique under a joint transforms correlator architecture", **J.F. Barrera R.**, M. Tebaldi, R. Torroba, *Asian Journal of Physics* **22**, 135-152 (2013).
21. "Optical encryption and QR codes: Secure and noise-free information retrieval", **J.F. Barrera R.**, A. Mira, R. Torroba, *Opt. Express* **21**, 5373-5378 (2013).
22. "Experimental protocol for packaging and encrypting multiple data", **J.F. Barrera R.**, S. Trejos, M. Tebaldi, R. Torroba, *Journal of Optics* **15**, 055406 (2013).
23. "Experimental multiplexing protocol to encrypt messages of any length", **J.F. Barrera R.**, A. Vélez, R. Torroba, *Journal of Optics* **15**, 055404 (2013).
24. "Multiplexing of encrypted data using fractal masks", **J.F. Barrera R.**, M. Tebaldi, D. Amaya, W. D. Furlan, J. Monsoriu, N. Bolognini, R. Torroba, *Opt. Lett.* **37**, 2895-2897 (2012).
25. "Master key generation to avoid the use of an external reference wave in an experimental JTC encrypting architecture", E. Rueda, C. Ríos, **J.F. Barrera R.**, R. Torroba, *Appl. Opt.* **51**, 1822-1827 (2012).
26. "Experimental multiplexing of encrypted movies using a JTC architecture", **J.F. Barrera R.**, M. Tebaldi, C. Ríos, E. Rueda, N. Bolognini, R. Torroba, *Opt. Express* **20**, 3388-3393 (2012).
27. "Optical smart packaging to reduce transmitted information", L. Cabezas, M. Tebaldi, **J.F. Barrera R.**, N. Bolognini, R. Torroba, *Opt. Express* **20**, 158-163 (2012).
28. "Pure optical dynamical color encryption", F. Mosso, M. Tebaldi, **J.F. Barrera R.**, N. Bolognini, R. Torroba, *Opt. Express* **19**, 13779-13786 (2011).
29. "All-optical encrypted movie", F. Mosso, **J.F. Barrera R.**, M. Tebaldi, N. Bolognini, R. Torroba, *Opt. Express* **19**, 5706-5712 (2011).
30. "Experimental opto-digital synthesis of encrypted sub-samples of an image to improve its decoded quality", **J.F. Barrera R.**, E. Rueda, C. Ríos, M. Tebaldi, N. Bolognini, R. Torroba, *Opt. Commun.* **284**, 4350-4355 (2011).
31. "Experimental multiplexing approach via code key rotations under a joint transform correlator scheme", E. Rueda, C. Ríos, **J.F. Barrera R.**, R. Henao, R. Torroba, *Opt. Commun.* **284**, 2500-2504 (2011).

32. "Known-plaintext attack on a joint transform correlator encrypting system", **J.F. Barrera R.**, C. Vargas, M. Tebaldi, R. Torroba, N. Bolognini, *Opt. Lett.* **35**, 3553-3555 (2010).
33. "Simultaneous use of Amplitude and phase to improve the validation process in a Joint Transform Correlator", **J.F. Barrera R.**, J. Serna, R. Torroba, *Optik* **121**, 1885-1890 (2010).
34. "Chosen-plaintext attack on a joint transform correlator encrypting system", **J.F. Barrera R.**, C. Vargas, M. Tebaldi, R. Torroba, *Opt. Commun.* **283**, 3917-3921 (2010).
35. "One step multiplexing optical encryption", **J.F. Barrera R.**, R. Torroba, *Opt. Commun.* **283**, 1268-1272 (2010).
36. "Noise-free recovery of optodigital encrypted and multiplexed images", R. Henao, E. Rueda, **J.F. Barrera R.**, R. Torroba, *Opt. Lett.* **35**, 333-335 (2010).
37. "Optical encryption with a reference wave in a joint transform correlator architecture", E. Rueda, **J.F. Barrera R.**, R. Henao, R. Torroba, *Opt. Commun.* **282**, 3243-3249 (2009).
38. "Efficient encrypting procedure using amplitude and phase as independent channels to display decoy objects", **J.F. Barrera R.**, R. Torroba, *Appl. Opt.* **48**, 3121-3129 (2009).
39. "Multiplexing encryption technique by combining random amplitude and phase masks", **J.F. Barrera R.**, M. Tebaldi, R. Torroba, N. Bolognini, *Optik* **120**, 351-355 (2009).
40. "Digital encryption with undercover multiplexing by scaling the encoding mask", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Optik* **120**, 342-346 (2009).
41. "Lateral shift multiplexing with a modified random mask in a JTC encrypting architecture", E. Rueda, **J.F. Barrera R.**, R. Henao, R. Torroba, *Opt. Eng.* **48**, 027006 (2009).
42. "Code retrieval via undercover multiplexing", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Optik* **119**, 139-142 (2008).
43. "Discussion on Fresnel's mirrors and Young's double-slit interferometers", **J.F. Barrera R.**, F.F. Medina, J. Garcia-Sucerquia, *Optik* **118**, 402-406 (2007).
44. "Multiple-encoding retrieval for optical security", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Opt. Commun.* **276**, 231-236 (2007).
45. "Diffraction criterion for a slit under spherical illumination", E. Rueda, F.F. Medina, **J.F. Barrera R.**, *Opt. Commun.* **274**, 32-36 (2007).
46. "Prevailing effects of interference or diffraction by multiple apertures", O. Quintero, **J.F. Barrera R.**, R. Henao, F.F. Medina, *Opt. Commun.* **266**, 558-561 (2006).
47. "Multiple image encryption using an aperture-modulated optical system", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Opt. Commun.* **261**, 29-33 (2006).
48. "Multiplexing encrypted data by using polarized light", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Opt. Commun.* **260**, 109-112 (2006).
49. "Multiplexing encryption-decryption via lateral shifting of a random phase mask", **J.F. Barrera R.**, R. Henao, M. Tebaldi, R. Torroba, N. Bolognini, *Opt. Commun.* **259**, 532-536 (2006).
50. "Fault tolerances using toroidal zone plate encryption", **J.F. Barrera R.**, R. Henao, R. Torroba, *Opt. Commun.* **256**, 489-494 (2005).
51. "Optical encryption method using toroidal zone plates", **J.F. Barrera R.**, R. Henao, R. Torroba, *Opt. Commun.* **248**, 35-40 (2005).
52. "Talbot effect for periodical objects limited by finite apertures: a new interpretation", **J.F. Barrera R.**, R. Henao, Z. Jaroszewicz, A. Kolodziejczyk, *Optik* **116**, 144-148 (2005).
53. "Minute details detection through Fresnel diffraction domain", J. Garcia-Sucerquia, F.F. Medina, **J.F. Barrera R.**, *Opt. Commun.* **253**, 250-256 (2005).

54. "Stokes Parameters Description for the Contrast Variations Observed in Fringes Generated by Digital Speckle Correlation", R. Henao, **J.F. Barrera R.**, R. Torroba, *Journal of Holography and Speckle* **1**, No. 2, 85-89 (2004).

Publications in international conference proceedings (19)

1. "Noise analysis and its reduction applied to optically encrypted data codes", R. Torroba, A. Vélez, **J.F. Barrera R.**, XXIV Congress of the International Commission for Optics (ICO 24), Proceedings of ICO XXIV, paper P4-01 (2017).
2. "Light Sword Lens as Effective Method of Presbyopia Compensation", K. Petelczyc, K. Kakarenko, A. Kolodziejczyk, Z. Jaroszewicz, M. Rękas, A. Mira-Agudelo, J.F. Barrera, R. Henao, *Frontiers in Optics 2016*, OSA Technical Digest (online) (Optical Society of America, 2016), paper FW2A.4.
3. "Simulation of Vision Corrected by the Light Sword Lens", K. Kakarenko, K. Petelczyc, A. Kolodziejczyk, Z. Jaroszewicz, A. Mira-Agudelo, J.F. Barrera, R. Henao, *Frontiers in Optics 2016*, OSA Technical Digest (online) (Optical Society of America, 2016), paper JTh2A.182.
4. "Multiplexing three-dimensional optically encrypted data", A. Vélez, J.F. Barrera R., R. Torroba, *Frontiers in Optics 2016*, OSA Technical Digest (online) (Optical Society of America, 2016), paper JW4A.45.
5. "Experimental scrambling technique to strengthen optical encryption", R. Torroba, A. Vélez, **J.F. Barrera R.**, XXIII Congress of the International Commission for Optics (ICO 23): enlightening the future, Proceedings of ICO XXIII, paper Opt_Imag_63_87 (2014).
6. "Information security using a joint transform correlator encrypting architecture", **J.F. Barrera R.**, A. Mira, R. Torroba, XXIII Congress of the International Commission for Optics (ICO 23): enlightening the future, Proceedings of ICO XXIII, paper Opt_Imag_313_452 (2014).
7. "Image enhancement in multiplexed data by using phase gratings in theta modulation encrypting techniques", L. Cabezas, M. Tebaldi, **J.F. Barrera R.**, N. Bolognini, R. Torroba, *Frontiers in Optics Conference 2012*, OSA Technical Digest (online) (Optical Society of America, 2012), paper FW3A.11.
8. "Subsampling technique to enhance the decoded output of JTC encrypting system", **J.F. Barrera R.**, E. Rueda, C. Ríos, M. Tebaldi, N. Bolognini, R. Torroba, XXII Congress of the International Commission for Optics: Light for the Development of the World, Proc. of SPIE Vol. 8011, 80117C (2011).
9. "Multi-user multiplexed scheme for decoding modulated-encoded sequential information", F. Mosso, M. Tebaldi, **J.F. Barrera R.**, N. Bolognini, R. Torroba, XXII Congress of the International Commission for Optics: Light for the Development of the World, Proc. of SPIE Vol. 8011, 801173 (2011).
10. "Optodigital protocol to avoid an external reference beam in a JTC encrypting processor", Carlos Ríos, Edgar Rueda, **J.F. Barrera R.**, Rodrigo Henao, Roberto Torroba, *Laser Science 2010*, OSA Technical Digest (CD) (Optical Society of America, 2010), paper JWA27.
11. "Optical Image Multiplexing Encryption Using Digital Holography in a JTC Architecture", E. Rueda, **J.F. Barrera R.**, R. Henao, and R. Torroba, *Digital Holography and Three-Dimensional Imaging 2009*, OSA Technical Digest (CD) (Optical Society of America, 2009), paper JTUB3.
12. "Encryption-Decryption in a four-wave mixing arrangement", **J.F. Barrera R.**, R. Henao, M. Tebaldi, N. Bolognini, R. Torroba, *International conference on Optics and*

- Optoelectronics, Proceedings of International conference on Optics and Optoelectronics, PP-OIP-4, 2005.
13. “Multiplexing optical encrypted images using an aperture channelling securing key”, **J.F. Barrera R.**, M. Tebaldi, R. Henao, N. Bolognini, R. Torroba, International conference on Optics and Optoelectronics, Proceedings of International conference on Optics and Optoelectronics, PP-OIP-5, 2005.
 14. “Optical encryption by means of the Talbot array illuminator”, **J.F. Barrera R.**, R. Henao, Z. Jaroszewicz, A. Kolodziejczyk, SPIE International Congress in Optics and Optoelectronics, SPIE Proceedings, Vol. 5954, pp. 59540I-1-6 (2005).
 15. “Talbot effect for the periodical object limited by a finite aperture”, **J.F. Barrera R.**, R. Henao, A. Kolodziejczyk, Z. Jaroszewicz, 14th Slovak-Czech-Polish Optical Conference on Wave and Quantum Aspects of Contemporary Optics, SPIE Proceedings, Vol. 5945, pp. 59450C-1-6 (2005).
 16. “Optical encryption method using zone plates”, **J.F. Barrera R.**, Rodrigo Henao; Roberto Torroba, RIAO/OPTILAS 2004 – 5th Iberoamerican Meeting on Optics and 8th Latin American Meeting on Optics, Lasers and Lasers and their Applications, SPIE Proceedings, Vol. 5622, pp. 1129-1132 (2004).
 17. “Interference and diffraction effects generated by multiple apertures”, O. Quintero, **J.F. Barrera R.**, R. Henao, F. Medina, RIAO/OPTILAS 2004 – 5th Iberoamerican Meeting on Optics and 8th Latin American Meeting on Optics, Lasers and Lasers and their Applications, SPIE Proceedings, Vol. 5622, pp. 1388-1392 (2004).
 18. “Distinguishing fine details by Fresnel domain diffraction”, F. Medina, **J.F. Barrera R.**, J. Garcia, RIAO/OPTILAS 2004 – 5th Iberoamerican Meeting on Optics and 8th Latin American Meeting on Optics, Lasers and Lasers and their Applications, SPIE Proceedings, Vol. 5622, pp. 1119-1123 (2004).
 19. “Finite object Talbot effect as a lens produced image”, **J.F. Barrera R.**, R. Henao y A. Kolodziejczyk, XIX Congress of the International Commission for Optics ICO XIX: Optics for the Quality of Life, SPIE Proceedings, Vol. 4829, pp. 40-41 (2002).

b) Publications in national peer-reviewed journals (18)

1. “Límites de velocidad y distancia en la transmisión de información por un enlace óptico de bajo costo con recuperación libre de ruido”, S.A. Montoya-Castro, M. Herrera-Duran, **J.F. Barrera R.**, Dyna **84**, 234-240 (2017).
2. “Encriptación óptica de información con recuperación libre de ruido”, **J.F. Barrera R.**, R. Torroba, Rev. Acad. Colomb. Cienc. Ex. Fis. Nat. **39**, 48-54 (2015).
3. “Protección de datos usando un sistema experimental de encriptación de correlador de transformada conjunta”, R. Torroba, **J.F. Barrera R.**, Rev. Acad. Colomb. Cienc. Ex. Fis. Nat. **39**, 55-60 (2015).
4. “Encriptación óptica empleando llaves Weierstrass-Mandelbrot”, F. Giménez, J. A. Monsoriu, **J.F. Barrera R.**, W. D. Furland, M. Tebaldi, N. Bolognini, R. Torroba, Modelling in Science Education and Learning **6**, No. 5, 55-65 (2013).
5. “Encriptación óptico-digital usando una arquitectura 4f”, C.A. Vargas, **J.F. Barrera R.**, R. Torroba, Revista Colombiana de Física **44**, No. 3, 289-293 (2012).
6. “Análisis de la Sensibilidad de un Sistema Óptico de Encriptación Bajo Rotaciones de la Llave de Seguridad”, C.A. Ríos, E.A. Rueda, **J.F. Barrera R.**, Revista Colombiana de Física **42**, No. 2, 227-231 (2010).

7. “Sistema óptico de encriptación de doble máscara de fase bajo arquitectura 4f”, C.A. Ríos, E.A. Rueda, **J.F. Barrera R.**, Revista Tecno Lógicas, **Segunda Edición Especial**, 75-96 (2010).
8. “Manejo seguro de múltiples datos mediante una técnica de multiplexado de ocultamiento”, **J.F. Barrera R.**, J.H. Serna, M. Tebaldi, N. Bolognini, R. Torroba, Revista Colombiana de Física **41**, No. 3, 645-647 (2009).
9. “Filtro Holográfico Adaptado”, J. Serna, **J.F. Barrera R.**, Revista Colombiana de Física **41**, No. 1, 142-144 (2009).
10. “Criterio Generalizado para la Distinción entre Difracción de Fraunhofer y Fresnel”, E.A. Rueda, **J.F. Barrera R.**, F. Medina, Revista Colombiana de Física **41**, No. 1, 128-130 (2009).
11. “Implementación de un filtro de muestreo como sensor de frente de onda tipo Hartmann”, A. Mira, **J.F. Barrera R.**, C. Macias, Revista Colombiana de Física **38**, No. 2, 589-582 (2006).
12. “Fidelidad espacial en la encriptación óptica con placas zonales como llave de seguridad”, **J.F. Barrera R.**, R. Henao, R. Torroba, Academia Colombiana de Ciencias Exactas, Físicas y Naturales **9205-65-8**, 252-256 (2005).
13. “Propiedad de restauración en el efecto Talbot”, **J.F. Barrera R.**, R. Henao, A. Kolodziejczyk, Academia Colombiana de Ciencias Exactas, Físicas y Naturales **9205-65-8**, 247-251 (2005).
14. “Autoimágenes en Fraunhofer-Fresnel”, **J.F. Barrera R.**, R. Henao, C. Osorio, F.F. Medina, Revista Colombiana de Física **36**, No. 1, 101-104 (2004).
15. “Estudio de la calidad de las autoimágenes por el efecto pupila”, **J.F. Barrera R.**, R. Henao, A. Kolodziejczyk, Revista Colombiana de Física **35**, No. 1, 184-187 (2003).
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17. “Features of phase wave front binary encoding and their potential utilization for alignment purposes”, **J.F. Barrera R.**, A. Kolodziejczyk, C. A. Rodriguez, Revista Colombiana de Física **34**, No. 1, 196-200 (2002).
18. “Hologramas generados por computador”, **J.F. Barrera R.**, R. Henao, A. Kolodziejczyk, Revista Colombiana de Física **33**, No. 2, 364-368 (2001).

c) Participation in conferences

Ponencias en congresos internacionales (34)

1. “Noise analysis and reduction applied to optically encrypted data codes”, R. Torroba, A. Velez, **J.F. Barrera R.**, 24th Congress of the International Commission for Optics *ICO-24*, (Tokyo, Japan) 2017.
2. “Tear film breakup time measurement based on corneal reflex interferences produced by dry spots”, M. Aldaba, A. Mira, C. García, **J.F. Barrera R.**, J. Pujol, The Annual Meeting of the Association for Research in Vision and Ophthalmology (ARVO) (Baltimore, USA) 2017.
3. “Performance of the light sword optical element for presbyopia correction: Prediction by objective evaluations and validation by Psychophysical tests”, W. Torres-Sepúlveda, A. Mira-Agudelo, **J.F. Barrera R.**, R. Henao, K. Petelczyc, A. Kolodziejczyk, RIAO/OPTILAS

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