Letter of commendation for Dr. Alejandro Ferrero Turrión

Alfred Schirmacher

In his scientific work at CSIC Madrid (Consejo Superior de Investigaciones Científicas), Dr. Alejandro Ferrero Turrión has substantially supported the working group titled *Grupo de Medidas de Radiación Óptica, Instituto de Óptica "Daza de Valdés"* to become a leading institution worldwide in goniometric investigations.

With great expertise, Dr. Ferrero has applied various mathematical tools to photometry and radiometry problems, notably to investigate modern colour-generating systems such as goniochromatic special-effects paintings. By considering the underlying fundamental mathematical and physical principles, he has systematically analysed specific experimental situations and thoroughly determined the resulting experimental uncertainties.

Here, Dr. Ferrero has shown great productivity, as demonstrated by over 60 scientific publications, in more than half of which he has served as the lead author. Works with relevance to the fields of the DfwG are attached in the publication list.

Dr. Ferrero's consistently helpful and cooperative demeanour has facilitated the success of EMRP and EMPIR scientific projects on gonio-reflectometry at European national metrology institutes. With respect to experimental methods of determining aspects of the appearance of surfaces (for example, when measuring and visually evaluating the sample features of *sparkle* and *graininess*), Dr. Ferrero's contributions have been particularly valuable. In three corresponding EU projects – xDReflect, BiRD, and BxDiff – he has been a highly renowned expert and mentor.

At the CIE, Dr. Ferrero has served as an internationally recognised expert, chairs CIE JTC 12, "Measurement of Sparkle", and provides expert advice to CIE TC 2-85, "Recommendation on the geometrical parameters for the measurement of the bidirectional reflectance distribution function (BRDF)". With this work he has also developed fundamental techniques for traceable measurements of colour standardisation-related measurands.

Publications with relevance to DfwG fields of work:

Alejandro Ferrero; Jeppe Frisvad; Lionel Simonot; Alfred Schirmacher; Joaquín Campos; Mathieu Hébert; Pablo Santafé. Fundamental scattering quantities for the determination of reflectance and transmittance. Optics Express. The Optical Society (OSA), 04/01/2021.

Alejandro Ferrero; et. al.. Preliminary measurement scales for sparkle and graininess. Optics Express. The Optical Society (OSA), 2021.

Khalil Huraibat; Esther Perales; Eric Kirchner; Ivo van der Lans; Alejandro Ferrero; Joaquín Campos. Visual validation of chromatic objects appearance rendered from spectrophotometric measurements. Journal of the Optical Society of America A: Optics and Image Science, and Vision. 37 - 8, pp. 1266 - 1275. The Optical Society (OSA), 2021.

Alejandro Ferrero; Joaquín Campos; Nina Basic; Marcel Pastuschek; Esther Perales; Geiland Porrovecchio; Marek Smid; Alfred Schirmacher; José Luis Velázquez; Francisco Míguel Martínez-Verdú. An insight into the present capabilities of national metrology institutes for measuring sparkle. Metrologia. 57 - 6, pp. 065029. BIPM & IOP Publishing Ltd, 05/11/2020.

Alejandro Ferrero Turrión; Berta Bernad; Joaquín Campos; Noël Richard; Christine Fernández-Maloigne; Manuel Melgosa. Goniochromatic assessment of gray scales for color change. Journal of the Optical Society of America A: Optics and Image Science, and Vision. 37 - 8, pp. 1266 - 1275. The Optical Society (OSA), 01/08/2020.

Alejandro Ferrero Turrión; Joaquín Campos; Berta Bernad; Alicia Pons; María Luisa Hernanz; Francisco Miguel Martínez Verdú; Andreas Höpe. Consistency analysis of multidimensional gonio-spectrophotometric measurements in interlaboratory comparisons. Metrologia. 53, pp. 1024 - 1030. IOP Science, 14/06/2016.

Eric Kirchner; Ivo van der Lans; Esther Perales; Francisco Miguel Martínez Verdú; Joaquín Campos; Alejandro Ferrero Turrión. Visibility of Sparkle in Metallic Paints. Journal of the Optical Society of America A: Optics and Image Science, and Vision. 32 - 5, pp. 921 - 927. The Optical Society (OSA), 27/04/2015.

Eric Kirchner; Alejandro Ferrero Turrión. Isochromatic lines as an extension of Helmholtz reciprocity principle for effect paints. Journal of the Optical Society of America A: Optics and Image Science, and Vision. 31 - 8, pp. 1861 - 1867. The Optical Society (OSA), 30/07/2014.

Alejandro Ferrero Turrión; Berta Bernad; Joaquín Campos Acosta; Francisco Miguel Martínez Verdú; Esther Perales; Ivo van der Lans; Eric Kirchner. Towards a better understanding of the color shift of effect coatings by densely sampled spectral BRDF measurement. Proceedings of SPIE – The International Society for Optical Engineering. 11, pp. 90180K - 90180K. SPIE, 24/02/2014.

Alejandro Ferrero Turrión; Esther Perales; Ana María Rabal Almazor; Joaquín Campos Acosta; Franciso Miguel Martínez Verdú; Elísabet Chorro; Alicia Pons Aglio. Color representation and interpretation of special effect coatings. Journal of the Optical Society of America A: Optics and Image Science, and Vision. 31 - 2, pp. 436 - 447. The Optical Society (OSA), 31/01/2014.