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Journal of Holography Applications in Physics

Conference Proceedings

3rd International Conference on Holography and its Applications (ICHA3 2024)

17-18, August 2024

Damghan, Iran

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School of Physics, Damghan University (DU)
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Message From the Damghan University President

In the name of God

Hello and welcome to the participants and speakers of the 3rd International Conference on Holography and its Applications.

With the aim of expanding and promoting science and also promoting of scientific and industrial progress, Damghan University has always sought to increase international interactions and has supported all kinds of effective activities in this direction. For this reason, in recent years, Damghan University has organized several international conferences in the fields of physics, mathematics, biology and industrial engineering.

The first conference with the aim of gathering research and researchers in the field of holography in one collection was held on 2022 and the second one on 2023.

We are so happy to witness this great event again after about 1 year and we hope to have a successful conference like the previous ones. In this conference, like the previous ones, brilliant physicists from Iran and around the world were present as speakers and participants. Today, this conference is supported by many associations and scientific institutions and domestic and foreign universities.

Although this conference is also held virtually due to health issues, but there is an in-person part organized by university of British Columbia.

In the end, I hope that attending this conference will be beneficial for all the participants, and I would also like to thank and appreciate the keynote speakers of this conference who will give speeches in this conference despite being very busy.

Dr. S. S. Eslami

Damghan University President

Message From the Conference Chair ICHA3 2024

Hello, I am Behnam Pourhassan, the conference chairman. Nice to see you here for the 3rd time. Welcome all to the Third International Conference on Holography and its Applications.

Conference Organizers

Third International Conference on Holography and its Applications, organized by Damghan University, the Canadian Quantum Research Center, and the University of British Columbia-Okanagan.

We are excited to share that the conference proceedings and selected papers will be published by the Journal of Holography Applications in Physics.

JHAP is currently being evaluated by Scopus.

Damghan University awarded some prizes to the selected papers of some issues

Damghan University consider also a big prize:

Important Announcement: Damghan University, in collaboration with some famous scientists in the field of holography, is excited to organize a prestigious scientific competition. The competition offers a first prize of approximately two thousand dollars. To participate, simply submit a letter of intent to the Journal of Holography Applications in Physics (JHAP). For more details, please visit the JHAP website at jhap.du.ac.ir. Prizes will be awarded in the next holography conference.

- The conference program is available on the conference website:

https://holography2024.du.ac.ir/en/

- List of all participants is also available on the conference website:

https://holography2024.du.ac.ir/files_site/files/r_6_240816143701.pdf

This conference is a joint activity between the Damghan University and the Canadian Quantum Research Center So, at the first, we invite Scott Jacobsen administrative director of CQRC to give a talk, then we attend seminar which will begin with the Juan Maldacena.

Prof. B. Pourhassan,

Conference Chair ICHA2 2023,
School of Physics,
Damghan University,
Iran

Message From the Academic Partner Administrative ICHA3 2024

Please see the following links.

Scott Jacobsen Message: https://www.youtube.com/watch?v=-3z_3mEZwPM

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Part One

Keynote Speakers

The no boundary wavefunction and density matrix of the universe

Juan Maldacena

Institute for Advanced Study, Princeton, NJ 08540, USA

Abstract: The Hartle Hawking no boundary proposal for the wavefunction of the universe is a theoretically well motivated proposal. We will first review this proposal and discuss its phenomenological problems. We then discuss a closely related no boundary proposal for the density matrix of the universe and explicitly compute it for some simple situations.

Talk link: https://www.youtube.com/watch?v=5Ph1_VioP5Q&t=9s

Saturday 17th August 2024

Reloading Black Hole Thermodynamics with Noether Charges

Shahin Sheikh-Jabbari

School of Physics, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran

Abstract: It is well-established that black holes obey laws of thermodynamics, in particular, there is the seminal Iyer-Wald derivation of the first law of thermodynamics for any stationary black hole solution of a generic diffeomorphism invariant theory of gravity. We revisit Iyer-Wald derivation within the framework of covariant phase space with fluctuating boundaries. We extend Iyer-Wald derivation by relaxing the need for the assumptions at a bifurcation surface and asymptotic infinity, as well as addressing the questions regarding the integrability of charges. Along the way, we also shed a clarifying light on the longstanding question of defining covariant charges in general relativity and present a first principles derivation of the Smarr relation within our framework.

Talk link: https://www.youtube.com/watch?v=fpy4Yo5Yivg

Saturday 17th August 2024

Probing Quantum gravity: From Cosmology to Fluids

Lawrence M. Krauss

The Origins Project Foundation, USA

Abstract: I discuss three different contexts in which quantum gravity may be probed, of relevance to holography. First, I demonstrate a way to experimentally probe whether gravity is a quantum theory. Then I discuss a gedanken experiment to probe for quantum hair on black holes, and finally I describe laboratory configurations related to fluids that may be useful to probe for possible quantum gravitational effects.

Talk link: https://www.youtube.com/watch?v=MXRS0V72J-E

Sunday 18th August 2024

Part Two

Invited Talks

Thermodynamics of a regular black hole

Sudhaker Upadyay

Department of Physics, K. L. S. College, Magadh University, Nawada 805110, India

Abstract: In this talk, we present a new exact regular black hole solution for the Einstein-Gauss-Bonnet gravity associated with nonlinear electrodynamics. There exist two horizons for the given black hole. Various thermal properties of this black hole are discussed following the modified first law of thermodynamics. Furthermore, we discuss both the local and global stability for the solution.

Talk link: https://www.youtube.com/watch?v=Jd9Hrj2-W4w

Saturday 17th August 2024

Tensor meson couplings in AdS/QCD

Shahin Mamedov

Center for Theoretical Physics, Khazar University, 41 Mehseti Street, Baku, AZ1096, Azerbaijan

Abstract: We study the hadronic and radiative couplings of the f2(1270) meson within the hard- and soft-wall models of AdS/QCD. The results for the tensor meson-nucleon-nucleon coupling (gf2NN) and tensor meson-photon-vector meson coupling (gf2γρ) are compared to the ones obtained by using the dispersion relations and amplitude methods, respectively. Qualitative agreement with different analyses implies the reliability of the holographic description of spin-2 meson.

Talk link: https://www.youtube.com/watch?v=NtikB-Mprqk

Saturday 17th August 2024

Structured-Light based Optical Trapping and Manipulation

L.-G. Wang

School of Physics, Zhejiang University, Hangzhou 310058, China

Abstract: Optical trapping and manipulation using structured laser beams now attract increasing attention in many areas including biology, atomic science, and nanofabrication. Here we investigated experimentally the use of a vortex-pair beam, a fractional vortex beam, and an Airy needle-like beam in optical trapping and manipulation, respectively. First, using the focal properties of such vortex-pair beams, we successfully manipulated two spherical microparticles simultaneously, and obtain the precise position-control on the microparticles by adjusting the off-axis parameter of the vortex-pair beam. The high-precision angular-controllable rotation of cylindrical microrods was realized by rotating the initial phase structure of such vortex-pair beams, which can be seen as an optical wrench due to two focused bright spots at the focal plane of objective lens. Then, we explored the manipulation feature of fractional vortex beams acting on trapped microparticles and precisely measured their rotation periods at the focal plane of practical FVBs by using a high-speed camera. We verified that the measured orbital angular momentum (OAM) derived from the collective microparticle rotation is roughly proportional to the fractional OAM of practical FVBs. We also experimentally obtained the trapped microparticles' power spectra under the illumination of FVBs, and from which we achieved the average trap stiffness to evaluate the two-dimensional trapping strength of the practical focused FVB intensity ring. Finally, we also showed the trapping and transport properties using the generated Airy needle-like beams. We believe that our experimental result provides an alternative manipulation of microparticles and may have potential applications in biological area, and optically driven micromachines or motors, by using these structured light beams.

Talk link: https://www.youtube.com/watch?v=Vc0TkMZ1tSk

Sunday 18th August 2024

Control of optical resolution beyond the diffraction limit in curved space

Jingxuan Zhang

School of Physics, Zhejiang University, 310058, Hangzhou, China

Abstract: Light dynamics in curved space has attracted much attentions in recent decades. The optical phenomena can be affected by spatial curvature in non-Euclidean space. Inspired by this concept, we investigate a conventional optical puzzle of diffraction limit in two-dimensional curved space. Here, we consider the issue of far-field Fraunhofer diffraction of light on a series of surfaces of revolution, and study on how the spatial curvature affects optical resolution.

From our results, we find that the positive curvature decreases the size of diffraction spot, leading to a super-resolution effect beyond the conventional diffraction limit. On the contrary, the optical resolution gets worse because of the size of diffraction spot is increased by negative curvature. These results reveal that the spatial curvature can be considered as a new degree of freedom to control optical super-resolution.

Finally, we put our perspective into a series of more realistic space in universe, for instance, a Schwarzschild black hole with/without dark energy and surface with periodic peanut-shell shape as investigation. Moreover, the varying optical resolution also provides a criterion to detect the presence of spatial curvature in universe.

Talk link: https://www.youtube.com/watch?v=jquu-RvSgXs

Sunday 18th August 2024

Holographic Storage in Nematic Liquid Crystals

Sait Eren San

Kocaeli University, izmit, Turkey

Abstract: New artificial materials and their applications are of crucial importance in Nanotechnology. Actually Liquid Crystals (LC) are seriously promissing materials because of their self assebled properties in this scope. In this invited talk, some case studies are discussed with mainly LC based materials. In regard to our Liquid Crystal experiments, the first application is devoted for diffraction grating experiments, which are performed by the usage of fullerene balls, graphene sheets and some other nanoparticles in the structure of LC molecules. Whereby we improve the performance of the proposed material, which is an effiecient candidate for Holographic Storage (In principle 1TByte storage per cubic centimeter). In the second case study, reorientation of Carbon Nanotubes (CNT) in LCs are discussed and our experimental outputs, revealing the efficient reorientation via Electric Fields and Magnetic Fields, are demonstrated.

Talk link: https://www.youtube.com/watch?v=IxHvXOVfrS8

Sunday 18th August 2024

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A Casimir-like Window to the Dark Universe

Syed Masood Ahmad Shah Bukhari

Zhejiang University, Hangzhou, China

Abstract: Virtual transitions in a Casimir-like configuration are used to probe the quantum aspects of dark energy and dark matter. The setup assumes an Unruh-DeWitt detector falling freely into a black hole surrounded by dark energy (represented by a positive cosmological constant Λ) and dark matter, becoming thermalized in the usual Unruh manner. Assuming a Boulware field state, we show that the detector clicks and emits acceleration radiation which manifests the signatures of the underlying geometry. For the dark energy, we observe a breakdown of Planckian thermality of the spectrum due to Λ. However, an enhancement of the radiation flux due to the dark energy is observed in it. For the dark matter case, where we consider perfect fluid dark matter (PFDM) halo around the black hole, thermality remains intact; only an enhancement or degrading of the spectrum is observed, which depends on the nature of PFDM. The findings may possibly offer some insights for the table-top experiments in analogue gravity paradigm.

Talk link: https://www.youtube.com/watch?v=u9keXADUPwU

Sunday 18th August 2024

Part Three

Oral and poster presentations

Abstract paper - Oral

Quantum information aspects of the problem of time

Salman Sajad Wani
Qatar Center for Quantum Computing, Hamad Bin Khalifa University, Doha, Qatar

Abstract. In this talk, we apply ideas from quantum information, like quantum state discrimination and Quantum Fisher Information (QFI), to understand the Wheeler-DeWitt equation and its consequences, as well as the issue of time in quantum cosmology. The main problem discussed is that quantum cosmology lacks an external time parameter, leading to a "timeless" universe in which quantum states do not change in the conventional sense. The talk examines how the scale factor, a crucial cosmological variable, might function as an intrinsic time variable and offer a framework for comprehending the quantum state dynamics of the cosmos. The analysis uses QFI to show that meaningful quantum state evolution is indicated by a non-zero QFI. Furthermore, we talk about how quantum state discrimination can be utilized to show how certain parameters can provide a meaningful notion of time.

Talk link: https://www.youtube.com/watch?v=6D2fubDnzPs

Saturday 17th August 2024

Abstract paper - Oral

AdS/BCFT black hole entropy in Horndeski gravity and holographic transport coefficients

Fabiano F. Santos
Departamento de Física, Universidade Federal do Maranhão, Campus Universitario do Bacanga, São Luís (MA), 65080-805, Brazil

Abstract. In this presentation, we examine the thermodynamics and hydrodynamics behaviors of a five-dimensional black hole under the influence of an external magnetic field. The solution is the gravity dual to the Anti-de Sitter/Boundary Conformal Field Theory correspondence, enabling the study of properties within an anisotropic fluid framework. Utilizing holographic renormalization, we compute the free energy and the holographic stress tensor residing on the boundary denoted as Q. Within the fluid/gravity correspondence framework, we have a class of boundary extensions in Q, where the stress-energy tensor describes a magnetizing conformal fluid. We discuss the characteristics of this special solution as well as its thermodynamic properties, including the bulk and shear viscosity, the square of the speed of sound, as well as the anisotropic effects induced by the magnetic field in the magnetized conformal plasma.

Talk link: https://www.youtube.com/watch?v=Ad0U42hLDdA

Saturday 17th August 2024

Abstract paper – Oral

Exponential corrections to the thermodynamics of charged quasitopological rotating black holes

Srivastava Vivek Kumar
Department of Physics, RBIPSSR, VBS Purvanchal University, Jaunpur, India

Abstract. In this work, thermodynamics of charged quasitopological rotating black holes to the non-perturbative level have been analysed, provided by the exponential term to the entropy of black hole. We study the behaviour of free energy per unit volume, angular momentum per unit volume, mass density, and specific heat per unit volume under the influence of exponentially corrected entropy. We also investigate the stability of such black holes and phase transition under the non-perturbative correction of rotating charged quasitopological black holes.

Talk link: https://www.youtube.com/watch?v=85du6PEKr3Q

Sunday 18th August 2024

Abstract paper – Poster

Tunneling Methods from Stationary and Dynamical Black Hole's Horizon

Sareh Eslamzadeh, Saheb SoroushFar
Department of Physics, College of Sciences, Yasouj University, 75918-74934, Yasouj, Iran.

Abstract. In this paper, we supply a brief explanation of tunneling methods applied to stationary and dynamical black holes. We explain two famous methods for calculating the imaginary part of the action for the tunneling particle. We extend definitions for dynamical black holes and gain the tunneling rate for a kind of dynamical black hole.

Sunday 18th August 2024

Full paper – Poster

Using Holograms in Interactive Advertising

Mehrdad Maleki Verki[1], Muhammad Piri [2]
[1] MA. Student, department of business management, faculty of literature and human sciences, Malayer University, Malayer, Iran
[2] Assistant Professor, Department of Business Administration, Faculty of Literature and Humanities, Malayer University, Malayer, Iran

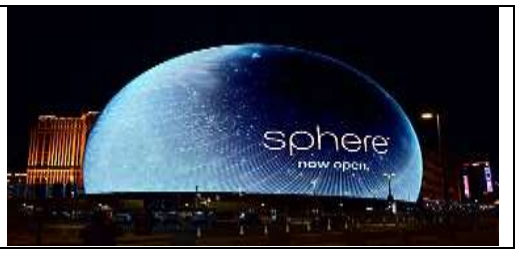
Abstract. Holographic advertising uses 3D holographic images to display products or messages, which provides a more interactive and engaging experience to the viewer compared to traditional advertising media. Due to the focus of large advertising companies on interactive advertising and the effectiveness of this type of advertising in today's world, the use of holograms can be effective for attracting more audiences and providing information as well as reducing costs caused by the time and type of traditional advertising. The experience of leading companies and organizations in this field can open the way for domestic industries and companies to use this attractive and popular industry. In this research, which has been prepared in the form of a domain review, an attempt has been made to outline the key and basic concepts of the new field of holographic advertising, and it is hoped that it will open the way for new and additional research in this field.

1 Introduction

Holography is similar to photography in terms of recording information on film, but the methods and tools for creating this image are completely different [9] because in the hologram or holography, information related to all three dimensions is recorded in the image, and the observer sees and the observer with Seeing the whole map gives a feeling of prominence in the image [16]. Holography is an optical technique that can record and reconstruct the wave front with amplitude and phase information, and due to its diverse and innovative applications, it has attracted a lot of attention in various industries. [15]

Advances in artificial intelligence and data analysis, along with new 3D advertising technologies, have boosted the billboard and environmental advertising market. Interactive displays in public spaces are connecting with customers in new ways - they offer brands a wide range of new opportunities to entertain, inform and promote their products. In this context, Exchange research shows that artificial intelligence and ultra-fast Internet connectivity have brought new growth to the new advertising industry, worth more than 25 billion euros worldwide. Major cities such as London, Paris and Tokyo are increasingly becoming Bringing interactive and 3D displays for entertainment and product promotion. In the United States, Delta Air Lines recently installed a high-tech 3D screen at Detroit Metropolitan Airport that provides passengers with personal information as they walk past it [26]. Esper opened in Las Vegas last year with a 16k LED display that cost an estimated €2

billion, making it the city's most expensive entertainment venue ever built. In this way, screens and layouts with advanced technology and using all the possibilities of interactive advertising change the way brands and citizens interact in public places. [14].

The exosphere on the Sphere in Paradise, Nevada, on January 26, 2024, during a U2 concert	

In marketing communications, 3D holograms as a 3D image that creates illusion with the help of laser waves are increasingly used to provide unforgettable experiences to consumers [3].
Currently, it is possible to produce holographic displays for advertising goods that allow customers to touch them and even feel their texture and temperature. This is achieved by using fluid air to mimic the resistance of the hologram design and artificially stimulate the consumer's senses in this way. [6].
The richer the visual and sensory stimuli are; the clearer the resulting visual images are. [18,4] By including 3D interactive displays and virtual tests in online environments, marketers can present visual images to consumers. facilitate and in turn fill some of the consumer's sensory gaps [12, 13].
When consumers interact with holographic advertisements, this type of sensory mobility [digital] can help them imagine themselves as future users of real products, which ultimately has a beneficial effect on their purchasing decisions. [3].
Marketers and retailers are looking for personalized solutions to speed up service processes [8] and the new proposed strategy for this is holographic advertising. The virtual environment can provide users with power, immersion, and imagination, all of which are interconnected in a systematic way that increases the sense of presence in the environment [7].
The importance of research is due to the fact that in today's era, due to the high cost and slow speed of traditional advertising, the correct use of graphic processing methods and augmented reality and 3D hologram imaging in advertising has become extremely important. The purpose of this research, which has been prepared as a review, is to investigate the concepts of holographic advertising and its effectiveness in interactive marketing. Hologram has the capacity to play a very important role in influencing the audience, delivering the advertising communication message and maintaining its success among the audience.

2 Literature review

2-1 Interactive marketing

Interactive marketing is a process of creating two-way communication between customers and the company, where customers share their views, choices and preferences about the product so that the marketer can improve it. In order for marketers to create an interactive marketing strategy, they must have the right tools and advanced technology, such as a 360-degree view of the customer. The purpose of interactive marketing is to capture the opinions, preferences and choices of customers and improve the marketing strategy. [20].
Interactive marketing emphasizes the ability to create and maintain relationships between customers and buyers. It also focuses on creating close relationships between the customer and the service provider to increase the commitment and trust between the parties [5].

2-2 Holographic advertising

The term "hologram" [as a three-dimensional image that creates illusion with laser waves] is composed of two Greek terms "holos" [meaning universal vision] and "gram" [meaning - written] [11].

For a long time, graphic design was used in the production of printed materials such as magazines, newspapers, books, advertisements, advertising posters, etc. However, advances in information technology have added a lot to graphic design, giving it an independent branch called "multimedia", which deals with computer graphics - without the need for printing - and presents them in a dynamic framework. Gives. Today, graphic processing methods in advertising campaigns using augmented reality and 3D hologram imaging have become very important and give products and services a special personality. [23]

Ko et al. [2024] in a research entitled "The effect of visual views in advertising on accessible products" have suggested the use of innovative visual strategies including mental simulation and 3D advertising to attract consumer preferences to marketing professionals. [17].

Recent technological advances in wearable technologies, such as mixed reality devices, enable consumers to interact with artificial 3D visual environments. This provides an incredible opportunity for service retailers to find alternative ways to Provide interaction with their services. [8].

Emerging technology devices have rapidly changed the way customers interact with retail services, encouraging retailers to look for dynamic ways to connect with users to become customer-centric [21].

3 Research Background

Sahin [2024] presenting a research entitled "The impact of transactions on the metaverse platforms of the digital world on accounting activities" based on the emergence of the metaverse and the creation of a new world order, believes that technologies such as virtual reality and holograms and augmented reality will interact with our physical world. And the future of various industries and services will depend on their capacity to accept these technologies. Naturally, trade and advertising are not exempt from this rule. [23]

In their research, Singh et al. [2023] show that new technologies, including artificial intelligence, machine learning, and holograms, have changed the way businesses operate from automation to providing data-based insights. It enables them to personalize their interactions with customers. Of course, they also point out the potential risks associated with the integration of these technologies. such as possible job loss and moral concerns. It is important for businesses to be aware of these issues and take steps to mitigate their impact, such as upskilling employees and implementing ethical standards for AI. This research emphasizes the importance of hologram technology and artificial intelligence and machine learning in the modern business landscape and highlights their potential for growth and success. It also emphasizes the need for businesses to accept these technologies with caution and ensure that their use is aligned with ethical standards and regulations. [24].

Vyudi et al. [2022] in a research titled "Metaverse Beyond the Hype: Multidisciplinary Perspectives on Challenges, Opportunities, and Emerging Agendas for Research, Practice, and Policy" by gathering the opinions and suggestions of experts and specialists from different disciplines regarding The future developments of business and the interaction of the physical and digital world provide opinions. The metaverse has the potential to extend the physical world using augmented reality and virtual reality technologies that allow users to seamlessly interact in real and simulated environments using avatars and holograms. The potential impact on how we do business, interact with brands and others, and develop shared experiences is likely to be transformative as the distinct lines between physical and digital are likely to be somewhat blurred from current perceptions. However, while the technology and infrastructure still lacks to enable the development of new immersive virtual worlds at scale – worlds that our avatars can traverse across platforms – researchers are increasingly investigating the impact of this There are changes. [8].

4 Result

Hologram marketing is increasingly becoming a standard marketing method that currently provides incredible experiences for consumers when they encounter virtual objects. The sense of sight is undoubtedly the most dominant sense of the human and marketing experts when designing the program. Marketing managers are aware of this fact when designing marketing programs. If visual communication is established with consumers, it can cause them to react positively and lead to the strengthening of emotional communication and loyalty. [2] The hologram display market is expected to reach a value of more than 253 billion US dollars by 2026 [25].

HolographicDisplay Market	

In the ever-changing landscape of marketing and brand development, staying ahead of the curve is essential for companies that are looking for a lasting impact on their target audience. Hologram event technology is one of the advanced innovations that has attracted the attention of marketers and organizers. This approach to interaction has changed the way brands communicate with their potential customers [18].
The expansion and development of holograms has been very significant and the first tactile 3D hologram capable of reacting to human touch was created in 2015 by a group of Japanese scientists [27].
Creativity and innovation is a mixture of abilities, preparations and individual characteristics that, if found in a suitable environment, can promote mental processes to lead to novel and useful results. Creativity is one of the most important elements of advertising because it is one of the most dynamic engines in the design process to achieve a positive impact on the recipient and plays a fundamental role in the effectiveness of the advertising message. Innovation in advertising is not a simple process or an innate talent or individual effort. Rather, it is an interconnected process that has fundamental determinants that influence and are influenced by the many variables and skills and abilities that must be present in the creative advertising "designer." Holographic technology is one of the technologies that enhances creative thinking, imaginative abilities and innovative skills, and in turn helps develop creative values in advertising design, which provides the necessary knowledge and skills to the advertising designer to contribute to the provision of innovative solutions. . To display "advertisements in a way that captures the attention of the recipient and affects the effectiveness of the advertising message. Holography can be defined as “the science of producing holograms, i.e. converting photographs into three-dimensional and three-dimensional. , with depth." Lasers can ionize air and turn it into plasma, through which a 3D image can be displayed in the air without the need for another medium, which can be seen as the future of holographic imaging technology. He mentioned the emergence of the latest ones.
The use of holographic technology in advertising gives companies a competitive advantage because the technology works to capture the attention of the ad receiver, especially if it is used in a way that is consistent with the nature of the advertising message [1].

References

[1] Ahmed;, Noha Hassan and Ahmed, Mahmoud Mahmoud Yousry [2021] "The effective use of holographic technology in enhancing the creative thinking of the advertising designer," International Design Journal: Vol. 11: Iss. 2, Article 19.

[2] Baltezarević, I. & Baltezarević, R. [2022a]. The impact of visual brand communication on social networks on consumer behavior during the crisis. In B. Đorđević [Eds.], THEMATIC PROCEEDINGS The impact of the covid 19 pandemic on economy, resources and sustainable development [pp.141 – 150]. Faculty of Management Zaječar, Megatrend university Belgrade ISBN 978-86-7747-644-1; UDK 616.98:578.834]:659; COBISS.SR-ID 57384201.

[3] Baltezarevic, Radoslav & Baltezarevic, Ivana. [2023]. Benefits of using holograms in marketing communication. 7. International Izmir economics congress, Izmir, Turkey.
[4] Basso, F., Petit, O., Le Bellu, S., Lahlou, S., Cancel, A., and Anton, J. L. [2018]. Taste at first [person] sight: visual perspective modulates brain activity implicitly associated with viewing unhealthy but not healthy foods. Appetite 128, 242–254. doi: 10.1016/j.appet.2018.06.009.
[5] Bastami, the angel; Jalilian, Hamidreza; Azami, Mohsen. [2017]. Investigating the effect of interactive marketing dimensions on customer satisfaction [case study: Bank Mehr Ekhtezad Ilam Province]. Master's thesis, Payam Noor University, Kermanshah. [in Persian]
[6] Christou, Adamos & Gao, Yongheng & Navaraj, William & Nassar, Habib & Dahiya, Ravinder. [2020]. 3D Touch Surface for Interactive Pseudo-Holographic Displays. Advanced Intelligent Systems. 4. 2000126. 10.1002/aisy.202000126.
[7] Cummings, J. J., & Bailenson, J. N. [2016]. How immersive is enough? A meta-analysis of the effect of immersive technology on user presence. Media psychology, 19[2], 272-309.
[8] Dehghani, M., Lee, S. H. M., & Mashatan, A. [2020]. Touching holograms with windows mixed reality: Renovating the consumer retailing services. Technology in Society, 63, 101394.
[9] Denis Gabor [1979-1900], Hungarian physicist and electrical engineer, inventor of holographic technology, winner of the 1971 Nobel Prize in Physics.
[10] Dwivedi, Yogesh K., et al. "Metaverse beyond the hype: Multidisciplinary perspectives on emerging challenges, opportunities, and agenda for research, practice and policy." International Journal of Information Management 66 [2022]: 102542. https://doi.org/10.1016/j.ijinfomgt.2022.102542
[11] Ghuloum, H. [2010]. 3D hologram technology in learning environment. In Informing science & IT education conference [pp. 693-704]. Informing Science Institute Santa Rosa, CA.
[12] Heller, J., Chylinski, M., de Ruyter, K., Mahr, D., and Keeling, D. I. [2019]. Let me imagine that for you: transforming the retail frontline through augmenting customer mental imagery ability. J. Retail. 95, 94–114. doi: 10.1016/j.jretai.2019.03.005.
[13] Ho, C., Jones, R., King, S., Murray, L., and Spence, C. [2013]. “Multisensory augmented reality in the context of a retail clothing application,” in [ABA] Audio Branding Academy Yearbook 2012/2013. eds. K. Bronner, R. Hirt and C. Ringe [Glashütte: Nomos], 167–174.
[14] https://www.vfxvoice.com/las-vegas-sphere-worlds-largest-high-res-led-screen-for-live-action-and-vfx/
[15] Jiang, Q.; Jin, G.; Cao, L. [2019] When met surface meets hologram: principle and advances. Adv. Opt. Photon. 2019, 11, 518–576.
[16] Khani Filistan, conductor; Mir Abbasi, Seyyed Ibrahim;. Ghanbari, Ezzatullah; [1400] performing non-destructive testing by holographic method; Applied research in technology and engineering summer 1400 - number 23 [10 pages - from 95 to 104[in Persian]
[17] Kou, Sining & Duan, Shen & Zhang, Yiran & Wang, Zhiling & Meng, Lu. [2024]. The impact of visual perspectives in advertisements on access-based products. Psychology & Marketing. 41. n/a-n/a. 10.1002/mar.21960.
[18] Marks, D. F. [1999]. Consciousness, mental imagery and action. Br. J. Psychol. 90, 567–585. doi: 10.1348/000712699161639.
[19] Miirage]2023] is an entertainment and communications system solution created for the events, entertainment and marketing industries. https://www.miirage.digital/
[20] Oly Ndubisi, N. [2007]. Relationship quality antecedents: the Malaysian retail banking perspective. International Journal of Quality & Reliability Management, 24[8], 829-845.
[21] Rauschnabel, P. A., Felix, R., & Hinsch, C. [2019]. Augmented reality marketing: How mobile AR-apps can improve brands through inspiration. Journal of Retailing and Consumer Services, 49, 43-53.
[22] Sabry, O., & Aboelnaga, H.S. [2021]. The Role of Modern Holographic Technology in Graphic Designs of Animated Advertising Campaigns. Journal of Design Sciences and Applied Arts, Article 8, Volume 2, Issue 2, June 2021, Page 118-128.
[23] ŞAHİN N. K.[2024] The Effect of Transactions on Digital Universe “Metaverse” Platforms on Accounting Activities, Hitit Sosyal Bilimler Dergisi [2024] ICAFR'23 Special Issue

[24] Singh, P. Lipsa Das, Dev Bahubal, Sangeeta Rani, Ajay Kumar [2023] AI/ML Revolutionizing Social Media and Business, A Comprehensive Study, book chapter [Security and Risk Analysis for Intelligent Cloud Computing, Methods, Applications, and Preventions] https://doi.org/10.1201/9781003329947
[25] Statista [2022]. 3D display market revenue worldwide in 2017 and 2026. https://www.statista.com/statistics/1038663/worldwide-3d-display-market-size/ [Accessed: 05.03.2023].
[26] The Exchange . www.theexchange.ws/
[27] The touchable hologram,at the Utsunomiya University Center for Optical Research and Education, One of the leading researchers of the experiment, Dr Yoichi Ochiai of Tsukuba University, https://www.reuters.com/article/idUSKBN0TJ18R/

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