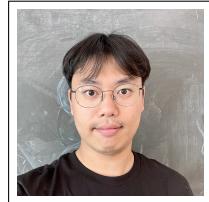


Dhong Yeon Cheong

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May 17, 2024
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Education

- 2019.3– **M.S./Ph.D. Integrated Program**, *Department of Physics*, Yonsei University, Seoul, Republic of Korea.
(Compulsory military duty, Technical Research Personnel : 2022.3.1 - 2025.6.19 (scheduled))
- 2015.3– **B.S.**, *Department of Physics*, Yonsei University, Seoul, Republic of Korea.
- 2019.2

Research Publications [Inspire-HEP]

1. D. Y. Cheong, S. C. Park, Chang Sub Shin, "Effective Theory Approach for Axion Wormholes", [\[arXiv:2310.11260\]](#)
2. G. Cacciapaglia, D. Y. Cheong, A. Deandrea, W. Isnard, S. C. Park, "Composite Hybrid Inflation : Dilaton and Waterfall Pions", [JCAP 10 \(2023\) 063](#), [\[arXiv:2307.01852\]](#)
3. D. Y. Cheong, K. Hamaguchi, Y. Kanazawa, S. M. Lee, N. Nagata, S. C. Park, "Axion Quality Problem and Non-Minimal Gravitational Coupling in the Palatini Formulation", [Phys. Rev. D 108, 015007](#), [\[arXiv:2210.11330\]](#)
4. K. Ban, D. Y. Cheong, H. Okada, H. Otsuka, J. C. Park, S. C. Park, "Phenomenological implications on a hidden sector from the Festina Lente bound", [PTEP 2023 \(2023\) 1, 013B04](#), [\[arXiv:2206.00890\]](#)
5. D. Y. Cheong, K. Kohri, and S. C. Park, "The Inflaton that Could : Primordial Black Holes and Second Order Gravitational Waves from Tachyonic Instability induced in Higgs- R^2 Inflation", [JCAP 10 \(2022\) 015](#), [\[arXiv:2205.14813\]](#)
6. S. M. Lee, D. Y. Cheong, S. C. Hyun, S. C. Park, and M. Seo "Festina-Lente Bound on Higgs Vacuum Structure and Inflation", [JHEP 02 \(2022\) 100](#), [\[arXiv:2111.04010\]](#)
7. D. Y. Cheong, S. M. Lee, and S. C. Park, "Reheating in Models with Nonminimal Coupling in metric and Palatini formalisms", [JCAP 02 \(2022\) 02, 029](#), [\[arXiv:2111.00825\]](#)
8. D. Y. Cheong, S. M. Lee, and S. C. Park, "Progress in Higgs inflation", [J. Korean Phys. Soc. \(2021\), \(Invited Review\)](#), [\[arXiv:2103.00177\]](#)
9. D. Y. Cheong, H. M. Lee, and S. C. Park, "Beyond the Starobinsky model for inflation", [Phys.Lett.B 805 \(2020\) 13545](#), [\[arXiv:2002.07981\]](#)
10. D. Y. Cheong, S. M. Lee, and S. C. Park, "Primordial Black Holes in Higgs- R^2 Inflation as a whole dark matter", [JCAP 01 \(2021\) 032](#), [\[arXiv:1912.12032\]](#)
11. D. Y. Cheong, S. M. Lee, and S. C. Park, "Higgs Inflation and the Refined dS Conjecture", [Phys. Lett. B789 \(2019\) 336-340](#), [\[arXiv:1811.03622\]](#)

Research Experience

2023.7 - **Visitor**, CERN Theoretical Physics Department, Geneva, Switzerland.

2024.1

2021.9 - **Visiting Research Assistant**, KIAS, Seoul, Republic of Korea.

2022.2

Research Interest

General Early Universe Cosmology, Dark Matter, BSM Physics.

Specific Inflation, Primordial Black Holes & Gravitational Waves, Axions, Ultralight Dark Matter

Awards and Scholarships

KPS Award (장려상), Korean Physical Society Fall 2023 .

CERN-CKC Graduate Student Fellowship 2023, Full support, 6 month visit at CERN TH.

Best Poster Award, "Yonsei HEP-COSMO recent research outputs ", Yonsei University Department of Physics Research Output Presentation Fall 2022 .

Outstanding Presentation Award, "Gravitational Waves and PBHs from Tachyonic Instability in Higgs- R^2 Inflation", KPS 2022 Spring Meeting.

Best Poster Award, "Criticality and Primordial Black Holes in Higgs- R^2 Inflation", Yonsei University Department of Physics Research Output Presentation Fall 2019.

Best Poster Award, "Criticality and Primordial Black Holes in Higgs- R^2 Inflation", 25th International Summer Institute on Phenomenology of Elementary Particles and Cosmology (SI2019).

Ph.D. Scholarship, Full scholarship for coursework, Yonsei University.

Service

2023- **Referee**, Journal of High Energy Physics .

Talks at Conferences & Workshops

2024.1.16 - **Workshop on Dark Universe**, Yeosu, Republic of Korea.

1.19 Oral presentation on "An Effective Approach for Axion Wormholes"

2024.1.9 - **Dark Matter as a Portal to New Physics 2024**, APCTP, Republic of Korea.

1.12 Invited Speaker , Oral presentation on "PBHS and GWs in Higgs- R^2 Inflation"

2023.11.9 **CosKASI ECR Seminar**, Online, Republic of Korea.

Invited Student Talk , Oral presentation on "Inflation and the Standard Model : Higgs- R^2 Inflation Framework"

2023.10.17 - **OKC@15**, Stockholm, Sweden.

10.19 Speaker , Oral presentation on "Primordial Black Holes and Gravitational Waves in Higgs- R^2 Inflation"

2023.9.26 - **DESY Theory Workshop 2023**, Hamburg, Germany.

9.29 Speaker , Oral presentation on "An Effective Approach for Axion Wormholes"

2023.6.12 - **PPC 2023: XVI International Conference on Interactions between Particle Physics**

and Cosmology, Daejeon, Republic of Korea.

Speaker , Oral presentation on "Composite Dilaton Inflation"

- 2023.1.16 - **2023 Winter-I NRF-JSPS Workshop in particle physics, cosmology, and gravitation**,
 1.18 Sapporo, Japan.
 Invited Speaker , Oral presentation on "PBHs, GWs, and the Standard Model: Higgs- R^2 Inflation Framework "
- 2022.12.12 - **100+7 GR & Beyond: Inflation**, Jeju, Republic of Korea.
 12.16 Invited Speaker , Oral presentation on "PBHs, GWs, and the Standard Model: PBHs & GWs in Higgs- R^2 Inflation "
- 2022.12.07 - **IBS-PNU Joint Workshop on Particle Physics and Cosmology**, Busan, Republic of
 12.10 Korea.
 Speaker, Oral presentation on "Primordial Black Holes and Gravitational Waves from the Tachyonic Instability in Higgs- R^2 Inflation"
- 2022.11.14 - **Korea-Japan Workshop on Dark Energy (9th edition)**, Yonsei University, Seoul,
 11.18 Republic of Korea.
 Speaker, Oral presentation on "Primordial Black Holes and Gravitational Waves from the Tachyonic Instability in Higgs- R^2 Inflation"
- 2022.10.21 - **Workshop on Physics of Dark Cosmos**, Busan , Republic of Korea.
 10.23 Speaker, Oral presentation on "Primordial Black Holes and Gravitational Waves from the Tachyonic Instability in Higgs- R^2 Inflation"
- 2022.10.19 - **KPS 2022 Fall Meeting**, Busan , Republic of Korea.
 10.21 Speaker, Oral presentation on "Axion Quality Problem and Non-Minimal Gravitational Coupling in the Palatini Formulation"
- 2022.6.20 - **LIO International Conference and France-Korea STAR Workshop on "Fundamental Forces from Colliders to Gravitational Waves"**, IP2I, Lyon , France.
 6.24 Speaker, Oral presentation on "Tachyonic Production of GWs in Higgs-R2 Inflation"
- 2022.4.20 - **KPS 2022 Spring Meeting**, Online , Republic of Korea.
 4.22 Speaker, Oral presentation on "Gravitational Waves and PBHs from Tachyonic Instability in Higgs- R^2 Inflation"
- 2022.3.19 - **Asia-Pacific School and Workshop on Gravitation and Cosmology 2022**, Online ,
 3.22 Taiwan.
 Speaker, Oral presentation on "Primordial Black Holes and GWs in Higgs- R^2 Inflation"
- 2021.11.26 - **Workshop on Particle Physics and Cosmology 2021**, Jeju, Republic of Korea.
 11.28 Speaker, Oral presentation on "Primordial Black Holes and Gravitational Waves in Higgs- R^2 Inflation"
- 2021.8.2 - **Asia-Pacific Workshop on Particle Physics and Cosmology 2021**, Online , Republic
 8.6 of Korea.
 Speaker, Oral presentation on "Filling the Gap : (Perturbative) Reheating in Higgs- R^2 Inflation"
- 2020.11.23 - **Online JGRG workshop 2020**, Online , Japan.
 11.27 Speaker, Oral presentation on "Primordial Black Holes as Dark Matter in Higgs- R^2 Inflation"
- 2020.9.20 - **LIO international conference on Composite connections of Higgs, Dark Matter and Neutrinos**, Online, France.
 9.25 Speaker, Oral presentation on "Primordial Black Holes in Higgs- R^2 Inflation"
- 2020.7.13 - **KPS 2020 Spring Meeting**, Online, Republic of Korea.
 7.15 Speaker, Oral presentation on "Beyond the Starobinsky Model for Inflation",
- 2019.8.18 - **25th International Summer Institute on Phenomenology of Elementary Particles and Cosmology (SI2019)**, Gangneung, Republic of Korea.
 8.23 Poster presentation on "Criticality and Primordial Black Holes in Higgs-R2 Inflation".
- 2019.4.24 - **KPS 2019 Spring Meeting**, Daejeon, Republic of Korea.
 4.26 Speaker, Oral presentation on the "Higgs Inflation and the Refined dS Conjecture".

- 2019.2.21 - **The 2nd KMI School (KMI School 2019)**, Nagoya, Japan.
2.23 Poster presentation on the "Higgs Inflation and the Refined dS Conjecture".

Other Conferences, Workshops & Schools

- 2022.7.4 - **QUC Summer School on “A.I. in High Energy Physics”**, *KIAS*, Republic of Korea.
7.15 Participant, topics covered including scattering amplitudes, EFT and machine learning
- 2020.1.7 - **2020 GGI Lectures on the Theory of Fundamental Interactions**, *Galileo Galilei Institute for Theoretical Physics, Florence*, Italy.
1.24 Participant
- 2019.7.22 - **IBS Summer School on Cosmology & Particle Physics**, *Daejeon*, Republic of Korea.
7.26 Participant.
- 2019.1.14 - **Saga - Yonsei Joint Workshop XV**, *Seoul*, Republic of Korea.
1.18 Participant.
- 2018.7.23 - **IBS Summer School on Cosmology & Particle Physics**, *Daejeon*, Republic of Korea.
7.27 Participant.
- 2018.7.4 - **ICHEP 2018 Seoul**, *Seoul*, Republic of Korea.
7.11 Participant.

Language

Korean - First language, Native proficiency
English - Second language, Native proficiency

Reference

- Seong Chan Park**, *Department of Physics*, Yonsei University, Seoul, 03722, Republic of Korea.
sc.park@yonsei.ac.kr
- Nicholas L. Rodd**, *Theory Group*, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA.
nrodd@lbl.gov

Research Statement and Plan, as of 2023

My research interests are focused on unraveling the extreme limits in the energy spectrum of our universe. On the high-energy spectrum, I am interested in the physics of inflation, from model building, EFT of inflation to observational signatures.

- Higgs- R^2 inflation - primordial black holes and second-order gravitational waves

I have studied this inflation model with a dim-4 non-minimal coupling term and an R^2 term, considering parameters motivated by the Standard Model Higgs. In [1912.12032] I investigated the possibility of the Higgs self-coupling running inducing an ultra-slow-roll phase and computed the curvature perturbations and the predicted primordial black hole abundance. Later, in [2205.14813] I examined a different range of parameter sets and discovered the inflaton can exhibit a temporal tachyonic instability phase, which also can be observed in the form of primordial black holes and second-order gravitational waves ranging from pulsar timing arrays up to LIGO/VIRGO/KAGRA frequencies. I also considered the effects of higher-order terms on the model in [2002.07981].

- Reheating

Investigating the reheating process is a task needed to make robust predictions from inflation, and to provide initial conditions of our thermal universe. In [2111.00825] I computed the reheating predictions for generic inflation models implementing non-minimal couplings, aiming to provide a general template for observational predictions at the CMB. Processes involving particle production during this extremely high energy phase are also my field of interest.

- EFT

I am also enthusiastic to implement EFT techniques to impose theoretical bounds on the structure of inflation and investigate its correlation to cosmological observables.

On the other side of the spectrum, shading light on ultralight dark matter candidates is a direction I am willing to pursue, mostly focusing on axions.

- Axions

QCD Axions, being an appealing solution to the strong CP problem, are also viable dark matter candidates. I have investigated the viability of the axion solution and the axion quality in the context of non-minimal gravity in [2210.11330] by computing the potential contribution from Euclidean wormholes.

- Observational Signatures

Finding signatures of these ultralight dark matter candidates is my recent interest, looking at both the cosmological aspects and ground base detectors. In addition, I am also interested in looking at these axion signatures with (high-frequency) gravitational waves, with black hole superradiance being an example.

Generic aspects of gravitational waves and dark matter physics (both theory and detection) are my interest as well, and I am willing to broaden my research fields that cover both theoretical and phenomenological studies.